Industry

MONTHLY MAGAZINE



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LIST OF CLASSIFICATIONS.

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Agencies, Foreign
Analytical Works
Bank & Insurance
Battery
Bills, Bonds, Hundies
Book Binding Materials
Books & Periodicals
Bottles & Corks
Brass Component
Brushes
Button & Ivory
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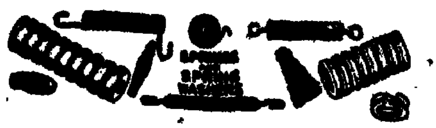
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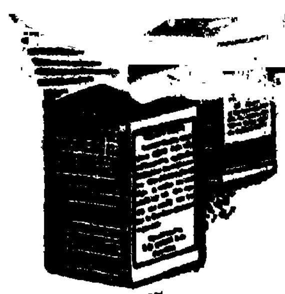
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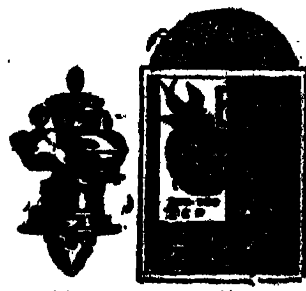
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Editor: K. N. BANERJEE.

Published in the first week of the month by

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Contents for November Issue.

November issue of "Industry" will contain many useful articles on commercial and industrial subjects such as Bleaching of Furs; Automobile Spray Painting; Manicure Preparations; Implements and Machines for Rice Farmers, etc., etc., in addition to the regular features such as Agricultural Tips; Scientific Researches and Inventions; Pharmaceutical Recipes; Recipes for Small Manufacturers; Formulas, Processes and Answers; Reader's Business Problems; Queries & Replies, etc.

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All enquiries regarding industrial or business information should be addressed to the Editor. Contributions and articles for review and notice should also be sent to him.

All enquiries regarding the Subscription or Advertisement Departments should be addressed to the General Manager.

OFFICE HOURS.

Editorial Department — 11 A.M. to 6 P.M. on weekdays & 11 A.M. to 2 P.M. on Saturdays

Subscription and Advertisement Department — 10 A.M. to 5 P.M. on weekdays — 10 A.M. to 2 P.M. on Saturdays.

Industry

Editor—
K. N. Banerjee

...E FOR MANUFACTURERS & BUSINESSMEN

Vol. XLV. | CALCUTTA, OCTOBER, 1954 | No. 535

BICYCLE INDUSTRY

One of our new industries, the bicycle industry is believed to have been able to make some progress, and that is the main reason why the Government has decided to grant to it a greater quantum of protection than recommended by the Tariff Commission. Obviously, the Government takes the view that the country's bicycle industry has made some encouraging progress and given proper protection, it will be possible for it to make *further progress and thus be in a position* to serve the interests of the consumers in a better and more effective manner.

Some may question the wisdom of the Government's policy in allowing the bicycle industry a greater quantum of protection than recommended by the Tariff Commission They may very well contend that the entire policy will fizzle out if the industry fails to utilize protection by stengthening its position to the extent and in the manner all expect it should. Secondly, it may be argued that the measure will spell hardship for the consumers who will continue to pay higher prices for the bicycle he purchases. But as against such views, it may be contended that the country's bicycle industry has not yet failed to make desirable progress under the protective wings of high tariffs on imported bicycles. Its past performance being bright euough there is absolutely no reason why one should take a pessimistic view of its future. Consumers certainly have a good reason to grumble. But if they look around and feel enthused by the great task of nation-building which India has incurring greater expenses on their articles of consumption. The greatest need of the hours is the noble emotion of patriotism which alone can lend weaning and beauty to our lofty task of nation-building.

The bicycle industry of this country had a very faint beginning during the war years and not until 1946 did it have any perceptible growth. As a result of the first tariff enquiry held in 1946 protective duties at 36 per cent *ad valorem* standard and 24 per cent preferential (applicable to British made cycles) came into force. The second enquiry raised the preferential rate to 60 per cent and the standard rate to 70 per cent. Besides, there was made a provision for a surcharge on all import duties. The protection (63 per cent preferential and 73.5 per cent standard) was to run for a period of 3 years upto 31st December, 1954. The present Tariff Commission recommended that protection should be continued for two more years that is upto December 31, 1956, at the rate of 45 per cent import duty, exclusive of surcharge on bicycles and parts of British Manufacture, the rates for bicycles and parts of non-British manufacture being adjusted according to trade agreements with the countries concerned. While fixing the rate of protective traiff at 45 per cent, the Commission worked on the basis that the ex-works price of an indigenously made bicycle would be a little over Rs. 116 as against about Rs. 87, the landed cost of a Phillips Cycle. A protective duty of 45 per ecnt would raise the

competitive capacity of the indigenously made cycles.

The Government has decided to continue protection for two more years with effect from 1st January, 1955. The duty charged will be as recommended by the Tariff Commission, 45 per cent preferential plus the surcharge, that is, 47½ per cent in all but subject to a minimum specific duty of Rs. 60 per cycle. In regard to cycles of non-British manufacture the rate of duty will be 10 per cent *ad valorem* in excess of the duty payable on cycles of British manufacture. As the Government sees it is necessary to increase the rate and quantum of protective tariff as otherwise the indigenously manufactured cycles will not be able to withstand competition from imported cycles which are much cheaper. The Government also takes the view that the protective tariff on component parts and accessories should continue as the country's small manufacturers who produce them are not yet in a position to compete with their foreign rivals. Protective tariffs alone cannot help an industry on to its feet. Even so, they serve a very useful purpose especially in the initial stages of industrial development and so, an economic system which is based on competition can hardly dispense with them. That protection in some shape or other is the mainstay of the capitalist system of economy, is amply borne out by the fact that even in the USA, which is supposed to be a highly industrialized country the need is being felt to-day to scale up duties on imports from the United Kingdom.

The Government's decisions referred to in the above paragraph offer substantial protection to the indigenous bicycle industry. The decision on components and accessories is directed at helping the small manufacturers engaged in the production of these goods, on to their feet.

It may be argued, that the Government has set a bad precedent by not accepting the recommendations of the Tariff Commission in regard to the cycle industry, orginally as they stood. But the Government's decision can be defended on the ground that it cannot ignore the interests of the country's millions on millions of poor men whose conveyance the bicycle is. By raising protective tariffs on cycles imported from abroad, the Government intends to provide the indigenous industry with an incentive to its growth. The manufacturer's margin of profit will increase and this may cause inconvenience to consumers for the time being. But ultimately, a bigger margin of profit will lead to further investments in the industry thereby strengthening its capacity to come into its own within the next few years. Once the desired improvement has taken place and the industry reached a sufficiently high level, the prices of its products may go down, bringing them within the orbit of the commonman's purchasing power. There is another important point, namely, that unless there is a general stepping-up of the country's economic condition and the people's standard of living, consumption of cycles inside this country would not go up. It is heartening to note that the Government has already undertaken the the work of development of the country's economy on a planned, comprehensive basis.

The consumer may very well choose to smart under a sense of grievance in as much as the high price of the indigenously made cycle is the direct outcome of the lack of competition created artificially by the application of high protective tariff. But a lowering of the duty on imported cycles will enable them to offer competition to the indigenously produced cycles ultimately crippling the capacity of the country's bicycle inudstry to develop and come into its own. It would mean most certainly increased costs on cycles imported from abroad and this will affect adversely our balance of payments position in international trade.

Some think that protection ought to have been given for a period longer than barely two years. Manufacturers could expect to work under stabler conditions, if protection were to continue for 5 years or more . Commenting on the advantages which could have come in the wake of protection continuing for a longer period, a Bombay Weekly writes: "Protection for a longer period ..... will encourage them (i.e., the manufacturers) to expand their activities with confidence, to bring down their cost and to earn as large margin of profit as possible. Besides it may attract new entrants into the field and thereby pave the way for healthy internal competition. Indeed, by restriction of the period of protection just two years, the Government is, in a way, nullifying the effects of the high rate of protection now offered.

There are two more points made by the aforesaid Bombay Weekly in support of the Government's policy. Our bicycle manufacturers can hardly compete with their foreign rivals so long they fail to liquidate the disadvantages that confront them in regard to raw materials. The country's ancilliary industries are not yet well

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CURRENT TOPICS

[illegible] FOOD

Despite ravages wrought by flood in certain parts of the country Mr. Kidwai, Union Food Minister, thinks that the food situation will remain unaffected. A statement of this nature is timely for it will serve as an effective insurance against opposition's attempts, if any, to make political capital out of the situation created by flood: at the same time it will counter the efforts of the antisocial ruffians who may once more take recourse to speculative hoarding of foodgrains in anticipation of future profits.

The Food Minister rules out the need for reintroduction of rationing and says that compared to the total cultivable area of land in the country, the extent of the affected areas is not so alarming.

Mr. Kidwai has not attempted, however, to minimize the gravity of the damage caused by flood. Describing the conditions in the flood affected areas in Bihar, he says that in Darbhanga the entire population has been affected. He has seen houses either under water or surrounded by water, paddy fields submerged or paddy planted for the second time washed away.

The extent of the damage caused in Bihar can be guessed from the following extract from a press report:—

He said that it would be difficult to estimate accurately the damage caused by the floods until the water receded. He believed that the total damage in northern Bihar would not be less than Rs. 30 crores. Nearly 10,000 sq. miles of land had been affected involving eight million people. In Darbhanga, 65% of the cultivated land was under water, and the total damage in the district could be estimated at Rs. 6,47,00,000.

Flood has destroyed property worth about Rs. 13 crores in North Bengal. The estimate is reported to have been made by the State Government. The Statesman gave the following details of the damage in its issue of August, 29 last:—

The total crop area devasted in these districts—Jalpaiguri, Cooch Behar, Malda, West Dinajpur and Darjeeling—is 779,000 acres. It is estimated that 4,730,000 mds. of rice worth Rs. 6,62,20,000 and 104,000 bales of jute valued at Rs. 1 crore have been destroyed.

The number of houses destroyed or damaged is put at 50,000, the loss in terms of money being Rs. 5 crores. About 1,500 head of cattle worth Rs. 3,75,000 have been washed away.

Apart from the damage to crops, thousands of acres of crop lands have been rendered barren, at least temporarily,

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developed and the components and parts produced by them, are not of a standard quality. The Government's policy is well worth supporting in as much as it seeks among other things, to place the ancilliary industries concerned on a firm footing.

The other point to which the Bombay Weekly draws attention is that there ought to be no objection to the Government of India imposing high tariffs on imported cycles when even in the industrialised USA the need is being felt for protecting that country's cycle industry by erecting high tariff against cycles of British manufacture. Protection, however, cannot be a permanent feature of our economy. The cycle industry ought to make the most of it by reducing its cost of production and by reducing the prices of its products. It must also aim at improving the quality of its manufacture. For the time the consumer could be persuaded to bear his burden calmly if he were made to realize that ultimately our cycle industry would be able to produce better quality cycles at cheaper costs.

having been covered by heavy deposits of sand. Extensive damage has also been caused to the railways, roads and bridges, and forests.

RUSSIAN AID

The USA can no longer claim to her credit a monopolist's position in regard to providing technical and other aids to India with a view to enabling her to develop and expand her national economy. She is now facing rivalry in the matter from Russia whose very name sends a cold shiver of disgust down her knotty spine. We, Indians, however, do not care to mind how the USA may react to the recent offers of aid made to us by Russia. It is enough that we have chosen to be guided by considerations of enlightened self interest; we are prepared to accept aids from all and sundry so long we could make sure that these aids would not jeopardize the freedom we have bought so dearly. Or, in other words we would accept aids from Russia as well as the USA and their respective camp followers, but on no account should we agree to camp with or become part and parcel of, either power blocks.

The first help that came from Russia relates to the four Russian tractors now being tried in Delhi and in Bhopal. The next offer of help was the alluring steel offer. Russia proposes to set up a steel plant in India and it is believed that India has accepted the offer. The third offer of help relates to the proposal to set up on extremely attractive terms a modern diamond plant at Panna (Vindhya Pradesh) and the promise to run it. Help of the nature was contemplated in the Indo-Russian trade agreement, signed in December, 1953. While the agreement was being negotiated, the representatives of Russia stated that their Government was prepared to render technical assistance that might be necessary in the installation and operation of equipment that might be supplied by the U.S.S.R. to India under the agreement.

Russia is acting with great speed and in all earnestness in the matter of providing technical and material help to India. It is believed that the proposed Russian steel plant will go into operation much before the German Rourkela factory. The Panna diamond plant is expected to go into operation in 1956.

The Statesman gives the following details about the Panna mines:—

"The Panna diamond mines....are the only mines producing precious stones in India. They are operated by a private company which is stated to have negotiated the deal with Russia.

"Recently the Company has discovered a streak, called the Majgawan pipe, which is its main source of diamonds of high quality. In addition to this promising locality, there are 22 other diamond bearing blocks.

"The Company has recently secured the assistance of Indian and foreign experts in assessing the potentialities of the area. Their opinion is that the Panna region is rich in diamond ore of high quality."

The steel offer came from Russia much to the surprise of all, and the time gap between the offer and its acceptance by India is still more surprising. The details of the Russian steel plant offer are not known. And yet none will fail to take into reckoning the political significance of the deal, for India is the first country outside the Communist sphere of influence to have shown a willingness to enter into a deal of this kind with the Soviet Union. The deal obviously testifies to the fact that the Government of India is guided by commercial considerations in such matters. India is prepared to strengthen her trade-relations with Russia and she knows that by so doing she stands to gain certain worthwhile advantages. India's foreign

policy is one of nonalignment with one or the other power political camp. Trade relations she has established with the U.S.A. and other member of the Anglo-U.S. block have not forced her into an alliance with them. So it will be quite baseless to read into Indo-Soviet commercial deals any similar significance.

INDIAN TEA

Speaking at the annual tea convention recently held at Bretton Woods, Mr. G. L. Mehta, India's Ambassador in the USA, said that the outlook for tea industry next season was bright. He estimated that the total Indian crop would be bigger than last year's. Referring to the decline of the value of India's trade with the USA last year, Mr. Mehta expressed the view that this was a reflection of the general trend of international trade which returned to normal with the disappearance of the artificial stimulus of the Korean war. As he said, "The sharp decline in India's imports from the USA—151 million dollars or less than half of the 1952 imports—might look disheartening but imports are after all only a means to an end and cannot by themselves be regarded as a criterion of economic health". Referring to the reduced demand for Indian jute in the USA, Mr. Mehta said that the fall was obviously due to a liquidation of stocks there and not to any long-term decline in demand.

SILK INDUSTRY

In the course of an article which appeared in a recent issue of Bombay's *Commerce*, Shri A. T. Janaki Raman, Secretary, Central Silk Board, says, "Despite tariff protection and measures taken by the States Governments interested in the industry for over two decades, organised progress was slow until World War II which gave a definite fillip to the industry. The Government created a Central Silk Board in 1949 as a statutory body to co-ordinate the activities of the silk industry in the various states interested in the development of the industry. Well-considered development plans to reorganise the industry on rational lines at each stage, from the cultivation of mulberry to the production of high grade raw silk, are already well ahead through the efforts of the Central Silk Board and the State Governments. The Government of India has been giving substantial grants to the Board for developing the industry in the States".

Shri Raman points out that the Indian silk industry will not continue to prosper if the quality of raw silk, employed by it does not conform to international standards. Referring to the present increased use of high-grade silk by the weaving industry, Shri Raman says as follows:—

"The contribution of the Indian Standards Institution to the Indian silk industry in the formulation of a series of Indian standards for Indian raw silk has to be viewed against the context of the change in the industry in the post-war period. The standards meet the need with reference to Indian raw materials, Indian conditions of work and requirements of Indian customers. Indian raw silk is divided into two categories—No. I and No. II. Two sets of standards have been prepared to provide two systems of grading one of which is comparable to that generally accepted in international trade, and the other for regulating internal trade in silk not reeled and packed according to internationally accepted practice."

PAPER INDUSTRY

The Indian paper industry possesses an installed capacity of 150,000 tons while the Planning Commission has set a production target of 200,000 tons of paper and board to be reached by 1955-56, the final year of the first five-year plan. The output of the industry in 1953 was 139,704 tons against 137,508 tons in 1952

and 131,916 tons in 1951. This year upto May the total output amounted to 42,940 tons, the average output per month being about 8,588 tons. This year's total output on this basis may amount to 103,566 tons which will not compare favourably with the previous two year's production figures. The outlook for the paper industry, therefore, does not seem bright and it is very unlikely that it will find it possible to reach the production target set by the Planning Commission.

Spokesmen of the industry blame its unsatisfactory development and progress on the competition offered to its products by imported paper quite a good quantity of which makes its way into the country under cover of "newsprint".

They often draw attention to another problem which needs to be liquidated to enable the industry to come into its own. "The principal raw materials of the industry are bamboo and *sabai* grass. These are forest products and are, therefore, under the jurisdiction of State Governments. Not only have these Governments not paid adequate attention to develop these raw materials properly but have also not hesitated to keep royalties on a very high level by auctioning the areas every year. This has provided opportunities for middlemen to bid the highest rates in the auctions and squeeze paper factories by charging exorbitant rates for the produce. Consequently the industry has been denied the opportunities for improving the supply as well as the quality of these raw materials. The Central Government's directives to the State Governments that they should give long-term leases at reasonable rates of royalty have also been in vain. This is most unfortunate. If the State Governments have failed thus to care for the country's interests which are being served by the industry, the only course open to the Centre is to frame a new legislation empowering it to control centrally the regions which abound in bamboo and *sabai* grass." (Commerce, Sept. 11, 1954).

The transport bottleneck is another villain of the piece. Raw materials and finished products of the paper industry have been classified under grade 'E' and lack of speedy transport facilities is causing deterioration in the quality of raw materials. The industry, therefore, has been asking the railways to upgrade the industry to class 'D' and also to allot a larger number of wagons for transporting its raw materials as well as finished products.

AGRICULTURAL TIPS

DETECTING DISEASE IN THE POULTRY

Anyone who has kept fowls can tell when a bird is out of sorts, and even the veriest novice can say if the disease is infectious when he is picking up dead birds every morning. But what we must try to do is to spot it before it has had time to establish itself firmly in the flock. It is of the utmost importance to diagnose an infectious disease at the earliest moment. The poultry owner should do his best to find it out for himself as soon as possible. He can take to heart the very old motto, "Incessant vigilance is the price of safety".

To keep a flock disease-free each individual member of that flock should be seen by the owner, not once a week but every day. Secondly, as soon as ever a bird is noticed to be ailing it should be removed from the flock and placed in an isolation coop. These are the first steps to take and I feel sure that if they were only conscientiously carried out we should be surprised at the elimination in the mortality from infectious diseases.

As to the actual diagnosis of the trouble in the isolated bird, the owner can go a long way towards discovering whether the condition is infectious or not by using his powers of observation. But he must exercise discretion. If a bird is thin, "going light", it may be affected with tuberculosis, but it may also be simply underfed through having been bullied; but if it shows a hearty appetite and still persists in growing thinner then the diagnosis of tuberculosis is practically certain to be correct. There are few infectious diseases which show characteristic and definite symptoms during life. Perhaps the disease which is most definite in that respect is roup. There is seldom a poultry owner who does not know the swollen and watering eyes, the warty combs, the swollen cheeks, and the yellow patches in the mouth.

On the whole the best guide to infectious disease during life is the examination of the droppings. Who has not heard of bacillary "white diarrhoea"? In adult fowls, however, beware of "yellow diarrhoea" and if ever a bird is seen to be so affected get it out of the flock at once to the isolation coop. It is 100 to 1 that it has developed fowl typhoid. At any rate there is practically no doubt about the disease being infectious.

Again if the droppings are reddish brown in colour and perhaps contain blood clots, one would recognise inflammation of the bowels. This condition may not be infectious, but as nearly all the causes of infections, whether bacteria or other parasites, produce such inflammation, and are passed out in the droppings. Any birds showing such symptoms should be isolated until the true nature of the trouble is ascertained.

So the poultry owner can learn quite a lot by simply using his eyes. He may even go as far as to make a post mortem examination of a dead bird, which is by far the most reliable method of diagnosis of infectious disease if suspected.

When any trouble appears in the flocks poultry owners, as they are, seem to be terrified lest the dreadful secret should leak out. "Hush it up, forget all about it; it will come right in the end" seem to be their slogans. Only when their birds are commencing to drop off

in a more or less steady stream do they think of calling in the specialist, and by that time the disease has firmly established itself in the flocks. This is a great pity but one cannot altogether blame such people. After all, they have their living to make, and for that purpose they must find a market for their produce and no body wants to buy eggs or chicks from deseased stock; but what they do not seem to realise is the fact that they are concealing the evil day, and that for only a very short time. For infectious disease will not be ignored. One may try to keep its presence dark, but sooner or later it has the unpleasant habit of proclaiming its own existence in no uncertain voice.

AGRICULTURAL OPERATIONS FOR NOVEMBER

For The Plains.

Vegetables.—Make successive sowings of peas, French beans, turnips, carrot, raddish, lettuce, beet, mustard and cress . Thin out betimes turnips, carrots and beet. Make successive plantings of cauliflower, cabbages, knolkhol, lettuce and celery. Stick peas before they begin to fall about. Earth up potatoes. Yans are now fit to be taken up for use. Plant out onion bulbs for obtaining a crop of seed in April. Take up mint and plant it in a fresh soil, well enriched.

Ornamental Plants—This is the best season for putting down cuttings of all kinds of roses, and indeed of most exotics— natives of colder climates. The several species of canna may now be dug up, and planted in fresh ground.

For The Hills

Vegetables. — During this month there is not much to be done in the way of sowing. Seedlings of last month's sowing should be put out under shelter. This is the best month for gathering seeds of most vegetables which have finished their growth.

Fruits—There is nothing to be done this month out of doors. It is not usual to cultivate fruit trees under glass on the hill yet young plants might be protected from the frost. which begins this month.

Flowers.—The principal operation this month is to protect such of the outdoor plants as need protection from the cold. Sometimes it snows during this month with heavy rain and sleet. In the houses the temperature must be raised and steadily maintained during the night, or the result will be fatal to many rare, beautiful and tender plants. Ferns and orchids in particular will suffer severely if the temperature is allowed to go down below 60°F. All plants will need less water, many none at all; but in this the gardener must be guided by experience and local requirements.

Aristocratic Finish by Pearl Lacquer

One of the most beautiful of decorative finishes is that produced by means of pearl essence. It has proved itself to be a practical finish for all kinds of appliances, artificial pearls, automobiles, buckles, buttons, decorations, displays, gifts, jewellery, lamps, novelties, nail polish, pencils, pens, pottery, statutary toys, toilet wares, and a host of other things too numerous to mention.

The story of pearl essence is a fascinating one. As long ago as some three hundred years the discovery was made that the iridescent lustre of fish scales was created by tiny crystals embodied in the skin attached to them, and was not part of that scales as had heretofore been imagined.

Originally the crystals were crudely lustre. Later, in France, attempts at greater refinement were carried on. Finally the crystals were identified as a chemical substance called "Guanin".

HOW OBTAINED

Guanin, as it exists in its pure crystalline form in the fish scale, is as a perfectly faceted diamond. Light flashes from each facet with radiant beauty. Not only this, but each crystal is capable of capturing light and dispersing it in the glorious colouring of the rainbow.

PROCESS OF SEPARATION

The process of separating the crystalloids of guanin from the fatty skin by which they are attached to the scale of the fish is a difficult one. Extreme care must be taken in their removal so that they may be kept in proper shape. They are very delicate and are easily injured by too violent agitation, and are very susceptable to harsh chemicals.

Herrings are the primary source of guanin or pearl essence. Schools of herrings are caught in wears, scined and dumped into dorys. Here the fish jump, flop, and rub against each other and by so doing shed their scales. The dorys are provided with slatted false bottoms through which the scales drop. They are then gathered up in baskets and rushed to the factory to be refined.

On arrival at the factory they are placed in churns into which also has been added a cleansing material i.e., ammonia. This separates the crystalloids from the scales.

After the crystals have been strained from the scales they are placed in tanks where they undergo chemical treatment to break down and dissolve the complex protein molecules of skin that still envelop them. After this process the crystalloids emerge in a fat-free state with a high lustre. They are now placed in high speed centrifuges where they are separated mechanically from all foreign matter.

The crystalline guanin is now in the form of an aqueous paste. This paste is now kneaded with lacquer. Because the crystalloids have a greater affinity for lacquer than for water they pass into the lacquer. The small amount of dirt and other foreign matter that still remains in the paste, because it has a greater preference for water than lacquer, stays in the water. The result is almost complete separation of crystalloids from foreign matter. Subsequent washing and kneading of this paste with further additions of clean water and special agents entirely removes all dirt and leaves the crystalloids lacquer paste perfectly clean, white in colour, and of sparkling brilliance.

METHOD OF MIXING

Up to the present time, pearl essence has only been incorporated successfully in lacquer—usually pyroxylin, but it may also be mixed in cellulose acetate, ethyl cellulose and other similar basis. Whatever thinners are ordinarily used for lacquers can be used for lacquer containing pearl essence. Pearl essence is usually incorporated into clear lacquer at from four to eight ounces per gallon. In this form it is called "Pearl Lacquer." It has at various times also been known "Essence D' Orient" and "Fish Silver".

The method usually employed when mixing pearl lacquer is to first thoroughly mix the pearl lacquer paste into a small amount of thinner, then add the required amount of clear lacquer, and afterwards thin to working consistency. It is always better to start with a less amount of pearl esence content and then gradually increase the amount until the proper mixture is obtained.

The lighter the background on which the pearl finish is to be applied, the more pearl essence is needed in the lacquer. The darker the background, the less pearl essence is required. For example, over black, use about 4 oz. of pearl essence to the gallon of clear lacquer and lacquer thinner mixture; over white, use from 6 to 8 oz. in a gallon of lacquer vehicle. For all other back grounds the mixing quantities will range between these two amounts according to colour.

METHODS OF APPLICATION

At the outset let us emphasize the fact that all surfaces on to which pearl lacquer is to be applied must be in good condition—because any blemish on the surface will be intensified by the pearl lacquer.

There is a variety of ways in which pearl lacquer may be applied. The following are the best:

Method I

Pearl lacquer over a coloured background. Finish the background in the required colour and when it is thoroughly dry, apply the pearl lacquer. Because the pearl essence is translucent it allows the ground colour to show through to a more or less degree. When pearl lacquer is applied over black in this manner, a beautiful gun-metal finish is obtained. When similarly applied over royal blue a shimmering effect of blue steel results.

Method II

Pearl lacquer, coloured.—Spririt soluble dyes, or small amounts of coloured lacquer enamel, are added to pearl lacquer and applied over a coloured or a white background.

Method III

Colour over pearl lacquer.—On a white background apply pearl lacquer. When dry, follow with a coat of clear lacquer to which has been added either spirit soluble dye or coloured lacquer enamel.

Method IV

Combinations of the above effects.

When applying pearl lacquer, the thing to always bear in mind is to keep the spray as wet as possible without causing runs or sags. On a flat surface use a fan spray and cross log. Keeping the spray wet allows the crystalloids to flow out and align themselves with their flat surfaces out, thus giving greater reflection and consequently a more refined pearly appearance.

It is a wise policy to protect pearl finishes from dirt and wear by giving them a final coat of half and half clear lacquer and lacquer thinner.

Manufacture of Squashes and Cordials

Squashes and cordials are the products of citrus fruits, such as oranges, lemons, limes, galgal, etc. During the season these fruits grow in plenty but due to lack of proper marketing organization and transport facilities, a huge quantity of the fruits go to waste. In order to utilise the surplus fruits the grower and industrialists may co-operate and should find a new outlet of the fruits. One of the profitable means is to start the manufacture of squashes and cordials as there is already a good demand of these products in the Indian markets.

Citrus fruit juices are rich in vitamin C, the antiscorbutic vitamin, and vitamin A valuable for growing children in combating colds, influenza, etc. They have additional therapeutic recommendations—citric acid preserves the alkaline balance of the blood. Hence the dietetic value of these real fruit juice beverages represents the chief advantage over similarly named synthetic products.

Let us now proceed with the preparation of squashes of different kinds of citrus fruits and then we take up the preparation of cordials.

SQUASHES

A fruit juice squash consists essentially of strained juice (with fine suspension of pulp) of a particular fruit to which a quantity of cane sugar is added. This is either pasteurised or chemically preserved. It is consumed after appropriate dilution with plain or soda water.

ORANGE SQUASH

Take fully ripe oranges. Wash thoroughly and cut the fruit into halves. Extract the juice from the cut fruits with a juice extractor made of non-corrodible metal and collect the juice in an aluminium pan or vessel.

For making squash of medium and high sugar content, weigh out the following amounts of juice, sugar and citric acid as the natural orange juice contains only a small percentage of acid. Citric acid is added to obtain the desired sugar acid blend into the finished product, otherwise the palatability and briskness of the dilute squash will suffer considerably.

Squash with medium sugar content is as follows:—

Orange juice	10 lbs.
Cane sugar	7 „
Citric acid	3 oz.

Squash with high sugar content is as follows:—

Orange juice	10 lbs.
Cane sugar	15½ „
Citric acid	7 oz.

As the procedure of both the formulas is the same we are discussing here jointly. Having weighed out the materials, mix them all together. Stir till thoroughly mixed. Add 1 oz of potassium metabisulphite for every 100 lbs of the finished product-this is equivalent to about 350 parts of sulphur dioxide per million parts of squash. Potassium metabisulphite in the above mentioned dose is a non-injurious chemical.

This amount of sulphur dioxide usually imparts an unpleasant sulphurous odour to the product which, however, diminishes with the aging of the product and completely disappears after 6 to 8 months' storage.

Now to each gallon of the product as prepared above add the following amounts of essence and colour:—

(1) Essence vita crush extract for orange squash ¾ fl.oz. or essence orange crush cloudy. 1 fl.oz.

(2) Concentrated orange colour, 4 c.c. of 4 per cent solution in water.

After mixing the essence and colour pour the squash into sterilished bottles (i.e. which have been previously boiled in water for half an hour); and seal air-tight. Store the bottles in cool dry place.

LEMON SQUASH

Take fully ripe sour limes or lemons and wash thoroughly. Cut the fruits into halves and press out the juice. Put the juice in wooden barrels and stir into it 2-3 lbs. of Fuller's earth for every 100 lbs of juice. The Fuller's earth should be free from moisture obtained by heating it for half an hour over moderate fire stirring with a spatula once or twice. As the earth settles it takes all the slimy stuffs down with it. Then the juice is passed through ordinary flannel filtering bags.

Now with this juice proceed as follows:—

Lemon juice	6 parts.
Refined cane water	12 lbs.
Citric acid	½ lb
Tincture of lemon peel	8 fl.oz.
Boric acid	1 oz.
Distilled water	1 gallon.

Dissolve the sugar in water, then add the lemon juice and boric acid and flannel bags. Then add the tincture of citric acid. Mix and strain through lemon peel and distilled water enough to make 4 gallons.

Another useful formula of preparing lemon squash recommended by M/S. Lal Singh and Girdhari Lal is as follows:—

In this they have advised to take European lemons, galgals or sour limes. The juice may be extracted and filtered as stated above and stored in aluminium or other non-corrodible vessel.

For making squash of medium (about 45° Balling) and high (about 65° Balling) sugar content, weigh out the following amounts of juice, sugar and water.

(1) Squash with medium sugar content:—

Lime juice	1 lb.
Refined sugar	1¼ „
Distilled water	¾ „

(2) Squash with high sugar content:—

Lime juice	1 lb.
Refined sugar	2 lbs.
Water	3 fl.oz.

Mix the above juice, sugar and water. Stir till thoroughly mixed. In (2) heat the mixture to about 130°F for dissolving the sugar. Add about 1 oz of potassium metabisulphite per 100 lbs of squash.

Next pour the squash into sterilized bottles (i.e. which have been boiled previously in water for half an hour) after adding a small amount of freshly extracted juice sacs. Seal air-tight and store in a cool dry place.

ARTIFICIAL LEMON SQUASH

I

Sugar	20 lbs.
Citric acid	10 oz.
Water	14 pints
Dissolve and add:—	
Salicylic acid	5 dr.
Oil of lemon	5 dr.
Tincture lemon peel	½ pint
Turmeric to colour.	

Shake up tincture with oil for 4 hours now and then. Allow oil to separate, decant tincture, mix it with the other ingredients and filter.

II

Sugar	2 lbs.
Citric acid	1 oz.
Distilled water	28 "
Dissolve and add:	
Oil of lemon	½ dr.
Tinct. of lemon peel	1 oz.
Tinct. turmeric	½ dr.
Caramel	20 mins.

Shake up the tincture of lemon peel with the oil of lemon occasionally during 4 hours; allow the oil to separate, decant the tincture and mix the latter with the other ingredients and filter.

CORDIALS

Cordials are products obtained by mixing or re-distilling neutral spirits, brandy or other distilled spirits with or over fruits, flowers, plants, or pure juices or other flavouring materials or extracts and to which sugar has been added in an amount not less than 2.5% by weight of the finished product.

Cordials must not be designated as distilled or compounded, although the principal difference between cordials and true wines and distilled spirits is that the former are compounded. Cordials may be placed in three categories. The first class of cordials is made by macerating the herbs, fruits and other ingredients in alcohol, and distilling; the distillate is sweetened and coloured. The second class of cordials is made by infusion or maserations, sweetening and filtering. The third class is made with the addition of a natural or synthetic fruit, flower, or herb oil to the spirits, along with sugar and colouring matter.

The cordial producer's equipment usually consists of storage tanks for spirits, the apparatus necessary for percolation, distilling, mixing, filtering, and in some few instances, for storing and aging.

As the cordials are both alcoholic and non-alcoholic, we only deal here the preparations of non-alcoholic ones.

These non-alcoholic cordials are made in great variety and are generally of a fruity character; during recent years they have acquired great popularity as beverages to be diluted for use in the household and for picnic purposes.

The following is a general formula for making fruit cordials:—

Cinnamon	5 dr.
Clove	2 dr. 24 gr.
Nutmeg	2 dr. 24 gr.
Alcohol (49 p.c.)	a sufficiency
Fruit syrup to produce 35 oz.	

Reduce the solids to No. 40 powder and percolate with alcohol (49 p.c.) until 9 oz. of percolate is obtained. To this add the syrup. Mix with 2 dr. of talc and filter.

LIME JUICE CORDIAL

Lime juice cordial may be prepared in various ways. Of these the following two processes are more or less easy but they take a few days to clarify and suitable for the market.

I.

In making lime juice cordial take fully ripe sour limes (Patty of Kaghzi variety), wash them thoroughly and cut them into halves. Extract the juice from the cut fruit with an ordinary lime squeezer.

Next strain the juice through a thick cloth and collect it in a non-corrodible vessel; (use glass carboys or wooden barels for storing larger amount of lime juice). Add potassium metabisulphite a little less than 1 ounce per 100 pounds of juice. Store the juice thus treated in a cool well ventilated room. By this treatment the foreign matter present in juice will settle down in about two or three weeks and a clear sparkling juice is obtained. For quick filtration,

however, special filtering bags may be used.

After the impurities settle at the bottom carefully decant the clear juice from the sediment and for making cordial of medium (about 35° Balling) sugar content, weigh out the following amount of juice, sugar and water—

(1)	Lime juice	1 lb.
	Refined sugar	1¼ lbs.
	Distilled water	1 lb.

(2) Cordial with high sugar content (about 65° Balling) —

II.

Distilled water	10 gals.
Glucose syrup	4 „
Crystal Sugar	54 lbs.
Lime juice	9 gals.
Essential oil of orange	2 fl. drs.
Salicylic acid	1 oz.
Spirit of wine	5 fl. oz.

Dissolve the sugar in water by heat, then add lime juice and glucose. Dissolve essential oils and salicylic acid in spirit, mix with rest filter. Instead of salicylic acid use 1/10 of 1 p.c. sodium benzoate.

CLARIFICATION OF RAW LIME JUICE

The milky or cloudy raw lime juice is passed through spanish clay, Another way is to stir the powdered clay up in the raw juice as it settles it takes all the slimy stuff down with it. Then, if desired, the juice may be further brightened by passing through ordinary thinned filtering bags.

III.

Boric acid	1 oz.
Citric acid	½ lb.
Sugar	12 lbs.
Distilled water	1 gal.
Lime juice	6 pints
Tinct. Lemon	8 fl. oz.

Dissolve the sugar in water, then add lime juice and acids, and tincture of lemon after straining. Add water to make 4 gallons.

IV.

Glucose syrup	8 gallons.
Cane sugar	108 lbs.
Water	20 gals.
Lime juice	18 „
Oil of orange	4 dr.
Oil of nutmeg	4 „
Alcohol (90 p.c.)	10 oz.

Dissolve the sugar in the water by heat, add the lime juice and glucose syrup. Dissolve the oils to the alcohol. mix with the cordial, and filter through a felt bag.

V.

Citric acid	2 oz.
Sugar	3 lbs.
Water	2 pints.

Dissolve by the aid of heat. When cold add:

Lime juice	30 oz.
Tincture of lemon	2 oz.
Water to produce	1 gallon

Caramel sufficient to colour.

ARTIFICIAL ORANGE CORDIAL

Sugar	2 lbs.
Water	26 oz.

Dissolve by heat and add:

Orangeade essence	1 oz.
Citric acid	½ oz.
Orange flower water	3 oz.
Caramel	1 dr.

Mix and then filter.

Preparation of Depilatories

Depilatories are preparations for removing hair from the body or superfluous hair from the face and armpits, where generally objection is made to employing a razor. Electrolysis is also employed, but does not appear to be so efficacious as a razor, and may disfigure the skin. The earliest chemical depilatories were made of orpiment or realgar, but on account of the danger of the poisonous nature of the chemical and the severe irritation likely to be caused there are not now used. The sulphides of barium, strontium, calcium, potassium and sodium are mostly employed in various depilatories and it should be noted that the diluents designed to overcome the irritating effects of the sulphides are not always successful. Even the least irritating preparation may in some cases cause dermatitis owing to idiosyncrasy of the user.

All sulphide depilatories require to be perfumed, as the unpleasantness of the odour has to be counter-balanced. For this purpose use mixture of geranium, lemon oil, bergamot oil, palmarosa, clove, cassia, benzyl acetate, etc.

To make white depilatory paste, use strontium sulphide or calcium sulphide and titanium dioxide.

In this article it is proposed to discuss with all sorts of popular preparations for depilating superfluous hair.

DEPILATORY PASTE

I

Strontium sulphide	15 parts.
Barium sulphide	15 „
Talc	10 „
Corn starch	20 „
Glycerine	18 „
Distilled water	20 „
Perfume	2 „

Mix the barium and strontium sulphide with the water and glycerine. Mix the starch and talc; sift the dry materials into the sulphide solution. Mix well and add the perfume and put in collapsible tubes or any other suitable container.

If the parts show signs of irritation or inflammation, cold cream should be applied after the washing.

II

Gum tragacanth	200 gr.
Water	10 fl. oz.

Soak the gum tragacanth in the water it forms a homogeneous jelly, then liquefy.

Sodium sulphide	400 gr.
Glycerine	10 dr.

and incorporate with the above jelly.

It should be kept free from the action of the air by pouring in collapsible tubes, but is best used fresh. A little terpineol may be added as perfume.

III

Barium sulphide	1 oz.
Corn starch	1¼ lb.
Potash carbonate	½ „
Olive oil	2 dr.
Lemongrass oil	10 drops.
Water	2 fl. oz.

Make a solution of barium sulphide with sufficient water in a glass or porcelain mortar together with potassium carbonate and starch and triturate until their union is evenly complete. Then pour down the olive oil drop by drop and stir on very briskly. Now allow the mass to dry in the strong sun for an hour. Take it up and re-macerate for the second time with the addition of lemongrass oil and pack as quickly as possible.

IV

Parhydrol	6 parts.
Antifibrin	0.15 part
Lanolin	30 parts.

Mix in a mortar and put in air-tight phials or tubes.

Before applying this cream, treat the skin with an alkaline solution, such as sodium carbonate, borax, etc., dissolved in water.

DEPILATORY CREAM

I

Titanium dioxide	30 fir.
Barium sulphide	74 „
Starch	100 „
Phenol	2 „
Lanolin	52 „
Stearic acid, D.P.	10 „
Triethanolamine	2.5 c.c.
Distilled water	275 c.c.

Add the triethanolamine and stearic acid to half the water. Heat the mixture until the stearic acid melts and then stir until a creamy soap forms. Allow the mixture to become lukewarm and then stir in starch and continue to stir until all lumps have disappeared. Dissolve the barium sulphide in the rest of water and bring to a boil. Then stir in the soap, starch solution and continue stirring until the mixture thickens. Add the melted lanolin and stir. Then slowly sift in the titanium dioxide and mix until smooth. Finally add the phenol and perfume.

II

Barium sulphide	40 parts.
Spermaceti	100 „
Petrolatum	300 „
Stearin	70 „
Tincture iodine	15 „
Potash carbonate	15 „
Water	400 „

Dissolve the potash carbonate in a portion of the water, and dissolve the barium sulphide in the rest of water. Now melt over water bath the petrolatum, spermaceti and stearin. Next slowly mix the potash solution with the melted mass. After this incorporate the barium sulphide solution with slow stirring. Finally add the tincture iodine and perfume, if so desired.

III

Calcium sulphide	150 parts.
Glucose	75 „
Corn starch	75 „
Perfume	1 part

Mix thoroughly.

DEPILATORY POMADE

Strontium sulphide	1 oz.
Sodium hydroxide	½ „
Orris root powder	½ „
Kaoi istambul	1 dr.
Olive oil	½ „
Soapstone powder	½ „

Take finely powdered orris root and strontium sulphide, pure. Macerate them together in a stone mortar for half an hour in combination with soapstone powder. Then damp the whole with a weak solution of caustic soda and olive oil to form a coarse emulsion. But the compound in a stoppered vessel in a cool place for 3 hours. Lastly add the Kahi istambul and finish.

LIQUID DEPILATORY

I

Sodium sulphide	7 gr.
Distilled water	80.5 cc.
Glycerine	10 c.c.
Alcohol, 90 p.c.	2 c.c.
Perfume	1 c.c.

Dissolve the sodium sulphide in some of the distilled water; add the glycerine and mix. Add the remaining water and finally the perfume, dissolve in the alcohol, mix well and filter. The strength of this depilartory can be increased by increasing the per centage of sodium sulphide but in no case should it exceed 10 per cent.

II

Sodium sulphide	10 per cent.
Ethyl ether or diethylglycol	10

Distilled water	67 ,,
Alcohol, 90 p.c.	2 ,,
Perfume	1 ,,

Dissolve the sodium sulphide in some of the distilled water; add the ether and mix; add the remainder of the water and the perfume dissolved in the alcohol. Mix thoroughly and pack in air-tight phials.

III

Distilled witch hazel water	5 fl.oz.
Sodium sulphide	4 dr.

Dissolve the sodium sulphide in the witch hazel water. Apply by means of cotton wool and wipe with dry cotton wool. After two or three minutes wash the part with plenty of water and freely apply powdered starch, which can be wiped off in 10 to 20 minutes.

DEPILATORY POWDER

In the preparation of depilatory powder all the ingredients should be very finely pulverised and mixed up thoroughly, and put up into packets. For application required amount of powder should be taken from the packet and mixed with water to form paste. Always keep the packet dry because the presence of the least moisture in the mass makes the entire preparation a failure.

The following are the recipes:—

I

Barium sulphide	250 gr.
Corn starch	750 ,,
Musk ketone	1 ,,

II

Barium sulphide	200 gr.
French chalk	200 ,,
Zinc oxide	100 ,,
Starch	800 ,,
Phenyl acetic aldehyde	2 c.c.

Mix.

III

Barium sulphide	50 parts.
Talc	70 ,,
Corn starch	70 ,,
Powdered soap	70 ,,
Benzaldehyde	1 part

Mix.

IV

Strontium	20 oz.
Corn starch	20 ,,
Talc	16 ,,
Menthol	10 gr.
Terpineol	1 oz.

Dissolve the menthol in the terpineol; rub it up with a little of the starch. Sift talc and strontium sulphide into the mixer. Mix and sift in the remainder of the starch, then sift in the menthol-perfume mixture. Mix the entire batch for about half an hour and then fill air-tight containers.

DEPILATORY SOAP

Washing soap	10 oz.
White starch	5 ,,
Barium sulphide	10 ,,

Treat all the above together in a stone mortar and immediately put them into the dies as required.

DEPILATORY CAKE

Barium sulphide	16 parts.
Zinc oxide	40 ,,
White vaseline	12 ,,

First pass the zinc oxide through a fine sieve. There should be no grit in it. Now add the barium sulphide in its dry condition and stir thoroughly. Again mix the vaseline with it and knead it thoroughly. Now cut into cubes and pass them in moulds.

DEPILATORY OIL

Bhringraj juice	16 parts.
Mundra (Calotropis gigentia)	1 part
Tripola	1 ,,
Shyamalata (Ichnocarpus frutexeus)	1 part

Mix and add sweet oil 4 parts and boil until the water of the juice is evaporated off.

AFTER—DEPILATORY LOTION

Acetic acid	2 oz.
Zinc stearate	16 ,,
Lavender oil	2 ,,
Distilled water	100 ,,

Mix until dissolved; filter through magnesium carbonate or talc to clarify.

Manufacture of Rice Products

There are three principal rice products of any commercial importance in India. These are parched rice (Muri or Murmura) beaten rice (Chira or Chura) and parched paddy (Khai or Khul).

The quantity of rice products estimated to be manufactured in the various provinces differs considerably and to a large extent reflects the demand, the character of which is highly variable and fairly localised. No data is available to show the volume of trade in parched rice, parched paddy and beaten rice but they occupy an important position from the marketing view point. Of the three products the beaten rice (Chura) occupies the foremost place due to the ability of the article to keep for several months without deterioration. The quantity of parched rice and beaten rice and its consumption exhibits a distinct seasonality in the late autumn in Northern India generally and in Bengal owing to the religious festivals which occur during October and November.

The total quantity of paddy (or rice) used in the manufacture of these products does not yield an equivalent quantity of products. Certain losses inevitably take place, as for example, in the natural moisture of the grain which is driven off by the parching process, a treatment in which great heat is applied. Some of the grains also fail to expand sufficiently and are winnowed out when the product is being finally dressed over before being put up for disposal.

Besides the three major parched products, the only other worth mentioning is rice flour prepared by grinding broken rice or bold coarse rice in hand or power driven chakkis.

Let us now deal with the methods of manufacture these rice products.

METHODS OF MANUFACTURE

As far as can be ascertained rice products are only prepared as a cottage industry. No costly machines and equipments are needed. Small investment gives a good return.

PARCHED RICE (Muri or Murmura)

Although parched rice is produced in almost every tract in which rice is grown, or consumed in any quantity, this product varies a good deal more in appearance and taste than parched paddy and beaten rice owing to the different methods of manufacture. In all cases, however, the kernel of the finished product is distended and crisp colour may vary from a greyish to brilliant white and the product may either be salted or unsalted. Well distended grain and very white kernels are most appreciated and fetch the best values.

No useful purpose will be served by endeavouring to describe the numerous small variations in the methods of parching adopted. Parboiled rice is always used, experience having shown that this type gives the best results. The parching operation of which the following is a brief description is a simple one in all essentials, Sand, which has previously been heated to a high temperature is poured into an iron pan which is stood over fire. Three or four handfuls of rice, or even more (depending on the size of the pan) are thrown into the pan and rapidly stirred into the hot sand with a long metal ladle. As soon as the rice begins to crackle and swell the contents of the pan are run off and the mixture of sand and parched rice passed through a

sieve in order to separate them. The sand is again heated and the process repeated.

Two or three variations of the above process are those adopted in Bengal, Bihar, Orissa and the Central Provinces. In Bengal the rice is first fried in an iron pan with prequent sprinklings of salt water. It is then removed and parched in hot sand as already described. In Bihar and Orissa a kind of parched rice known as bhunja is made from unsalted parboiled rice in the same way as the parched rice of Bengal. The name Murhi, however, is given in Bihar and Orissa of a product made from paddy by a different process. The paddy is soaked in water for two or three days. It is then boiled for one to two hours and is followed up by drying (in the sun), dehusking (by pestle and mortar), salting, frying and finally parching in hot sand in the usual way. In the Central Provinces, parched rice is made directly from rice which has been previously steeped for several hours in a dilute salt solution. It is dried and parched in hot sand.

GROUND PARCHED RICE (Sattu)

After parched rice has been made it is winnowed or sieved and small insufficiently expanded kernels which have no saleable value are set apart for grinding into flour by means of the hand chakki. This product is known in Northern India as Sattu, and is in some demand especially in hot summer months.

PARCHED PADDY (Khai or Khul)

The following is a typical method of preparing parched paddy. The grain (paddy) is first dried in the sun for a period which varies according to the season. In winter, for instance, fully 8 to 12 hours may be necessary, in the summer only 4 hours usually suffice. In the evening the dried paddy is filled into large earthen jars. Hot water is then poured into the jars and after two or three minutes the water is emptied out. These jars are now [illegible] and kept in that position throughout the night. In the morning the moist paddy is taken out and exposed to the sun for a short period. While it is still moist, it is kneaded and at the conclusion of this operation parching is carried on exactly as has already been described in the previous paragraph. During this process, a fair proportion of the kernels expand and burst and turn into soft white grains. After parching has been completed sand and the grains are separated through a sieve and the product is subsequently winnowed in order to remove the husk. The resultant products of this treatment are (1) Khai or Khul (burst soft white kernels), (2) thuddi (unburst hard parched kernels) and (3) husk and foreign matter. Thuddi are manufactured into murmuras of inferior quality.

CHURA OR BEATEN RICE

The most desirable quality characteristics of beaten rice are that it should be thin and papery and of white colour (the whiter the better). The flakes should also be as large and broad as possible and there should be minimum of small or broken flakes.

Beaten rice is, generally, prepared in the following manner from paddy and never directly from rice. The paddy is steeped in water for two or three days to soften the kernel. It is then boiled for a few minutes and taken off the fire. When the water in which the grain has been boiled has cooled, it is drained off. The paddy is now placed in a shallow concave earthenware vessel or iron pan and kept over a strong fire until the husk bursts open. The next operation consists of pounding the grain, generally by means of a wooden pestle. This flattens the rice kernel and removes the husk. The latter is finally separated by winnowing in the usual way in a tray. The procedure adopted in the Uttar Pradesh is slightly different in that the paddy is directly fried after soaking and without having been boiled.

PRODUCTION AND UTILISATION OF SECONDARY RICE PRODUCTS

These products may be regarded as consisting of paddy husk or broken rice bran. The quantity of rice flour derived by grinding whole or broken rice is comparatively insignificant from a marketing point of view and has already been touched on elsewhere.

The approximate annual output of paddy husk may be estimated at an average figure of about 10 million tons. A considerable proportion of this quantity is utilised as fuel for domestic cooking and for firing the boilers in large rice mills. A certain amount is consumed in admixture with rice bran by cattle. A small quantity is also mixed with mud plaster as a "binder". Any surplus remaining after these requirements as dumped into manure heaps for compost making. The use of rice husk in the activated carbon process of gur manufacture appears to have some potentialities.

Rice bran is of considerable commercial importance on account of its high nutritive value. It is mainly utilised as a cattle food.

Pruning of Fruit Trees

It is desirable, with all fruit trees, to do a certain amount of pruning. The removal of branches that are poorly spaced about the trunks and that come out at sharp angles, thus indicating future weak crotches, should be done at planting time if two-year old trees being planted. It is often necessary also to do a certain amount of "thinning out" and "heading back" while the tree is young in order to train to the form desired. It must be remembered however, that too much pruning in order to secure a desired form may be detrimental to the early growth and fruiting of the tree Pruning at different times of the year often results in different amounts of growth and fruit production.

After fruit trees have borne serveral heavy crops, it is often desirable to increase the amount of pruning which they receive. The removal of small branches and twigs, by making numerous cuts evenly distributed over the tree, will invigorate the parts left by increasing their water and nutrient supply. More light will be admitted to all parts of the tree, and terminal, spur and lateral growth will be increased.

The amount of pruning required will naturally vary with the kinds of fruits their fruiting habits and other factors such as fertilization and soil management.

OPERATIONS

The following operations are needed such as:

(1) Selecting the pruning tools.

(2) Deciding when the pruning should be done.

(3) Determining how heavily the tree should be pruned.

(4) Pruning the different tree fruits.

Let us now discuss all the operations one by one.

SELECTING THE PRUNING TOOLS

The kind of pruning tools used vary in the different sections of the country. The tools most commonly found are saws, knives, handshears, long-handled shears, and pole pruners.

SAWS

In the West the swivel blade or meat saw type is used to a great extent but it has never been universally adopted. In the East, many growers use a straight-bladed saw, that is somewhat similar to a carpenter's saw but usually is not so wide at the butt. A satisfactory saw for general pruning is one about 2 ft. long, 1 inch wide at the tip, and 4 inches wide at the butt, containing 6 to 7 teeth per inch. It should have a handle large enough to take the entire hand. Such a saw can be used even in narrow crotches and will be satisfactory for both small and large limbs. If it is necessary to make many large cuts, as often happens when renovating an old tree such as orchard, it will pay to have a forester's type of saw, which is heavier and have fewer and larger teeth. Such a saw cuts through the large limbs more easily and saves the energy of the man. The crescent-shaped type of saw, which cuts when the saw is pulled, is especially satisfactory for branches of medium size or where there is little room in which to use a saw. In no case should a two-edged saw be used as it is bound to cause injury to the trees.

KNIVES AND PRUNING SHEARS

For small trees, a heavy pruning knives with a long hooked blades is often used. A good, strong pair of pruning shears is indispensable, however, in pruning young trees. Most of the pruning with all fruits can be done for several years with such shears. Do not buy cheap shears, which are easily strained and dulled. Those of good weight, containing the best steel blades should be selected.

LONG-HANDLED SHEARS

Long-handled shears commonly called "two foots" because the handles are about 2 feet in length, are of great value. Much of the pruning can be done with this kind of shears in all bearing orchard. There are, of course, good and bad makes on the market. Generally speaking, the single-acting shears with wooden handles are not as satisfactory or powerful as the double acting shears. There are, however, some single acting shears with steel handles and wood hand grips that give excellent service. With such shears, many large limbs can be removed without the need of a saw and the work can be done as well and more quickly. The blades should be kept riveted down to make a clean smooth cut.

POLE PRUNERS

The pole pruners have only a limited use in orchard pruning. For ordinary cuts, which can easily be made any of the foregoing tools, pole pruners should never be used. They are awkward to handle and it is difficult to make a close, smooth cut with them. Only when it seems desirable on young bearing trees to head back the centres of certain of the main limbs which cannot be reached from the ground are pole pruners of much value to the orchardist. In such cases they may be the most economical pruning tool that can be used. Such tool should be as light and made as mechanically strong as possible. Unless used carefully, the cutting blade becomes strained, bent or broken, resulting in much annoyance and loss of time.

DECIDING WHEN THE PRUNING SHOULD BE DONE

One of the first questions to decide relation to pruning is the time of the year at which the work should be done. A few years ago much was heard rela-

ing to the advantage of summer pruning and the question of summer versus winter pruning was given much consideration. Advocates of summer pruning held that in many cases a whole year could be saved in building the framework of the tree, that a larger fruit spur system could be developed while the tree was young and that earlier and larger crops would result.

Careful pruning experiments in this and other countries during the past 15 years have shown, however, that as a general rule dormant pruning over a number of years has been more satisfactory when measured by tree growth and fruit yields than in summer pruning. Young trees given approximately the same kind and amount of pruning in the summer as that given to similar trees in the winter have generally produced less new growth, slightly smaller trunks and root systems and have not borne any earlier or larger crops. As a matter of fact in most of the experiments recorded the yields from the summer prune trees have been less.

By summer pruning considerable leaf area is removed. As a result less carbohydrates are formed and dwarfing results. Pruning in mid-summer just when growth in length has ceased would be expected to be more devitalizing than earlier and later summer pruning. With earlier pruning some new leaves would be formed after the pruning and with later leaves would be formed after the pruning and with later summer pruning the leaves would remain on the trees and function for a longer period before removed.

Certain types of summer pruning may occasionally be desirable. The pinching out of undesirable shoots just after growth starts in newly planted trees may be of advantage in forming a proper framework in young trees. Water sprouts or suckers old trees can easily be rubbed off in early spring. No doubts the remaining parts of the tree will be benefited more by the resultant additional amounts of water and soil nutrients they will thus receive than by the small amount of carbohydrates these shaded shoots might add. In some seasons it may pay to thin out lightly in early summer young trees which are making a thick, dense growth, but this type of pruning can very easily be overdone. Young trees, which appear to be quite dense, usually "open up" well when their first crops are borne. It may be desirable to head back an occasional limb or a young tree during the summer simply to maintain a better shape of tree.

Experiments show that pruning can be done at any time from leaf fall in the autumn until the buds start to grow in the spring. In some sections where the winters are unusually cold, there may be some danger of winter injury to the fresh pruning wounds and in such cases it would be well, especially with peaches and stone fruits, to wait until spring before doing the pruning. In general, if one had only a few trees to prune and plenty of help, the work might well be left until spring; otherwise pruning should be started in the fall of winter. Wounds made just as growth is starting in the spring heal a little quicker but *this would not be of enough importance to delay the pruning if there was much of it to do.*

DETERMINING HOW HEAVILY FREE SHOULD BE PRUNED

While the general principles underlying pruning hold for trees of all ages, old bearing trees generally requires heavier pruning than do young non-bearing trees. Accordingly, it is well to consider separately the pruning of young and of old trees.

PRUNING YOUNG NEW BEARING TREES

The best results are usually secured by pruning young trees, lightly. Experiments in this and other countries have shown that with young trees pruning is a dwarfing process. Trees pruned heavily each year have smaller trunks and smaller main branches, make less total top and root growth, have fewer spurs, come into bearing later, and bear smaller crops, at least for the first few years, than trees pruned lightly.

Pruning, by causing a decrease in leaf areas, dwarfs the tree and reduces fruiting. When some of the branches of a tree are removed by "thinning out" and those remaining are "headed back", a large number of buds which might otherwise grow are removed. This means of course that the leaf area of the tree is reduced in proportion to the severity of the pruning.

It is true that by heading back a branch vigorous shoots generally occur just back of the cut. One or two of these shoots at least will generally make a longer growth, have larger leaves and continue growth later in the season then if the heading back has not been done. This probably is due to the greater water and nutrient supply for those buds left after the pruning, because the roots for a time at least would not be dwarfed. The carbohydrate supply in proportion to the nitrogen would probably be less also. *By this heading back, however, the total leaf area produced on the limb would probably be less, since fewer spurs and lateral growths would be formed.* Larger numbers of fruit spurs almost always occur on limbs which are not cut back. It will be recalled that a whorl of several leaves occurs about each spur. Thus the reduction of one or two spurs with their accompanying leaves might, alone, more than offset any increased leaf area, on some shoots due to increased growth, from heading back as already explained.

If, in addition of heading back certain branches, some of the other limbs which would normally form new sprus and shoots growth were entirely removed, it can readily be seen how the total leaf area per tree would be lessened. With the leaf area reduced, the amount of carbohydrates and other food formed from them are generally reduced also.

With the reduced root growth resulting for pruning, less top growth would be produced each year in the heavily pruned trees and thus the dwarfing, in comparison to the lighter pruned trees, would be more pronounced each year as the pruning continued, at least until the lightly pruned trees were bearing heavily. Heavily pruned young trees due to the increased leaf area are often decreased in size more than the weight of wood cut off. That is, unpruned trees, at 5 or 6 years will often weigh more than heavily pruned trees plus the weight of the prunings removed during the 5 or 6 years.

PRUNE YOUNG BEARING TREES LIGHTLY

More wood growth and fruit are produced, if young bearing trees are given light rather than heavy pruning. Although lightly pruned trees may appear a little thick, while bearing the first few crops, still the trees usually develop faster and produce heavier crops. *On young bearing trees the fruit usually is of good size and colour even though the trees are lightly pruned.* The amount of pruning can well be increased after two or three commercial crops have been borne.

Lower branches, which are not injurious to any of the permanent branches can well be left for a few years to fruit can gradually be removed after the trees have borne a few crops and much benefit will have resulted from their

presence unless they have competed with some of the permanent branches. Of course where it appears that any of the lower branches are competing with a main branch, they should be removed at once. After the trees have reached middle age and have borne several crops, better results are generally secured if a somewhat heavier type of pruning is given.

PRUNE OLD BEARING TREES MORE HEAVILY

Old bearing trees somewhat low in vigour generally respond better to moderately heavy pruning than to light pruning. The tops of such trees gradually become filled with numerous branches which are thickly set with old and weak spurs. Relatively little new spur or terminal growth occurs yearly and the leaves are often small and yellowish in appearance. One gets the impression that there is too much top for the roots. The buds on the spurs open into a whorl of leaves each year, but very little new extention growth is made. Likewise, only very short terminal growth occurs over the tree. The wood of such trees gradually become packed with carbohydrates proportion to nitrate and such trees become non vegetative and unfruitful.

With such trees moderately heavy pruning or much heavier applications of invigorating effect. If larger amounts of fertilizers are not added, heavy pruning will be especially beneficial. The pruning should consist primarily or making numerous small cuts equally distributed over the entire tree, so that all parts will be invigorated. The lower limbs should be well thinned out and in some cases it will pay to head back, lightly, an occasional slender weak limb to an upward growing branch. As attempt should be made to keep the lower limbs growing and fruiting as well as those in the upper parts of the tree. The ends of the upper branches should also be headed back to good laterals. This will tend to lower the trees and stimulate growth in the lower as well as upper branches.

As a result of removing numerous small branches containing large numbers of spurts and buds, the amount of carbohydrates will be reduced and more water and nitrates will be made available for each of the buds left. Thus with old bearing trees of low vigour, heavier pruning generally causes an increased amount of extension growth. Although the tops of such trees may be reduced some by pruning, yields are seldom reduced and are often increased.

In conclusion, it may be mentioned here that regular annual pruning should be practised in order to keep the trees open so that efficient spraying can be done, so that sunlight can reach all parts of the trees to assist in carbohydrate manufacture and the colouring of fruit, so that limb rub of fruit will be reduced, good growth will be maintained in all parts of the tree, good size of fruit will be maintained, and so that the tops of the trees will not get too high.

Artificial Leather

The manufacture of artificial leather from latex is to-day an important branch of leather industry. The products, which are obtained in the form of sheets of any desired thickness, are extensively used for a variety of purposes. In the manufacture of natural leather boots and shoes, cheaper artificial leathers are used to build up parts of the article which are not normally visible and where little wear is encountered. Artificial leather of considerable strength, being also available, are used as outer soles and uppers for special types of footwear. These products are also used for trunks, suitcases, bags and for upholstery. A particular grade of leather substitute, made by the impregnation of paper, is given attractively coloured nitro-cellulose finishes and then goes to make belts, hand-bags, cuffs, dress' facings and other accessories of the feminine fashion world.

Artificial leather prepared on a basis of latex consists of a sheet of rubber heavily filled with disintegrated leather waste or with vegetable fibres. The processes in use fall into two classes. Firstly, there are the processes which depend on the impregnation with latex on an existing sheet of fibrous material. Secondly, there are the processes in which the fibrous material and the latex compound are mixed together the sheet being formed subsequently.

The raw material of the first group of processes may be woven cotton fabrics, an absorbent paper or a web of wood screen.

The cotton fabric, to be used for this purpose may be raised to a nap on both surfaces. It should be degreased by treatment with a hot solution of a suitable scouring agent, being then squeezed out, rinsed and dried. The first impregnating bath should have a total solid content of about 20% and may thus be prepared by diluting an unconcentrated ammonia preserved latex which is first suitably compounded with vulcanising agents, a wetting agent and a moderate amount of filler, one should use a slow accelerator to avoid vulcanisation during drying, but the accelerator should be one readily activated by the faster accelerator which is present in the spreading compound, and is capable of diffusing through the whole of the rubber in the impregnated fabric. Impregnation with a latex compound not only gives weight and body to the fabric foundation, but enables the surface spread layers to weld on to, and be continuous with, the whole structure. There is thus no chance if the filled latex coatings being stripped off or of the cloth itself fraying or unravelling when the artificial leather is cut. After drying the impregnated fabric further impregnation may be effected by immersion in the undiluted mix. The following latex compound is suitable for the impregnation bath:

		parts by weight
(A)	Zinc oxide	5 ,, ,,
	Sulphur	1.5 ,, ,,
	Dispersing agent	0.75 ,, ,,
	Casein	0.3 ,, ,,
	Caustic soda	0.2 ,, ,,
	Mercapto-benzothiazole	0.5 ,, ,,
	Water	6.75 ,, ,,

		parts by weight
(B)	15% paste of sodium cetyl sulphate	6.5 ,, ,,
	China clay	50 ,, ,,
	Water	43.5 ,, ,,

		parts by weight
(C)	Normal Ammoniated latex	100 ,, ,,
	15% paste of sodium cetyl sulphate	100

In preparing this compound, mixture (A) is ground together and is then worked into mixture (B), which is prepared by thorough stirring, the whole finally being mixed with (C) by slow and prolonged stirring.

The impregnated and dried fabric should now be coated on the spreading machine with a normal type of latex spreading compound, a suitable recipe of which is given below:—

	parts by weight
Zinc oxide	5 ,, ,,
Sulphur	,, ,,
Piperidine pentamethylene dithio carbamate	1 ,, ,,
Anti oxidant	1.5 ,, ,,
Dispersol	1.0 ,, ,,
Casein	0.4 ,, ,,
Caustic soda	0.08 ,, ,,
Water	9 ,, ,,

The above are ground together to form the vulcanising paste, which is used as under:

		parts by weight
(A)	China clay	50 ,, ,,
	Lithopone	50 ,, ,,
	Dispersol	1 ,, ,,
	Water	10 ,, ,,
	Vulcanising paste	20 ,, ,,
		parts by weight
(B)	Tragon A	1 ,, ,,
	Water	24 ,, ,,
		parts by weight
(C)	60% ammonia preserved latex	166 ,, ,,
	20% caustic potash solution	2.5 ,, ,,
	15% paste of sodium cetyl sulphate	13 ,, ,,

Mixture (A) is prepared by stirring and to it is added (B), made by stirring the gum into the boiling water. In compounding (C), the latex is stirred into the stabiliser paste followed by the alkali and finally by the oil. (A) plus (B) are then worked into (C). The finished artificial leather should be vulcanised by heating for 40 minutes at 100°C.

An absorbent paper may be treated in a similar manner, but in this case the process is sometimes confined to the impregnation stage, and the dried product may then be given a nitro-cellulose finish.

An interesting method of preparing artificial leather with paper is described below. The paper web preferably formed from unbeaten or tightly beaten wood fibre, should be in an interfelted condition. Light suction may be used to dry the web, but mechanical pressure at any stage should be avoided. Mercerised fibre is bulky, absorbent and shrinks little on drying but does not interfelt readily. Therefore, while a proportion of such pulp is advantageous, it should not be used alone. The absorptive properties, of dry web may be increased by saturating it with a reducing agent, such as alcohol, acetone, soap solution, etc., and again drying. This swells the web which does not shrink back to the original thickness on drying. At the impregnation stage, the dry web is passed into latex which may contain 10 to 30% of rubber, 2 to 5% sulphur, plus accelerators, pigments, fillers, etc. After squeezing out the excess between light rollers, the rubber is coagulated either by the drying process or by a preliminary treatment with dilute acetic acid. Such artificial leather may contain as much as 100% of rubber, or even more on the total weight of fibre, and yet resemble natural leather.

A sheet of material for use in the shoe manufacturing field as insoles, midsoles and sock lining, for the manufacture of water resistant cement sacks, and for panel boards, motor car antisqueak packing, etc., may be made on a paper machine.

In the manufacture of artificial leather from a loose, coherent sheet or felt or fibres, there is advantage in first spraying the surface with latex to stick the fibres

together and yet still leave the sheet permeable. The actual impregnation may be effected by passing the material between low pressure rollers fed with a fluid latex mix. Finally the material is dried in hot air, calendered and vulcanised. The latex impregnation of a fibre fleece may be carried out by alternately compressing and releasing the load on the material immersed in a bath of compounded latex. The cycle is repeated several times.

A difficulty, sometimes encountered in the preparation of artificial leather from a loosely interfelted sheet of fibres, is that of inducing enough latex to remain in the sheet so that drying and compressions will give a product of the desired composition. This problem may be solved by making the latex heat-sensitive and the impregnated sheet or by the use of a latex pretreated with a delayed action coagulant.

The second class of processes, in which the latex is mixed with the fibres it is to find before the sheet is found, includes those important products the "reconstituted leathers" in which the fillers consist of disintegrated leather waste. This class, has two sub-divisions, viz., the products made by drying a concentrated uncoagulated paste of filled latex, and products made by coagulating the latex rubber on to the fibres in a fairly dilute suspension and then separating off the fibres in sheet form on a screen.

In the first subdivision comes the common process of using an aqueous slurry of short cotton fibres or long-fibred paper pulp as a filler in the compounded latex and with this mix building up a relatively thick layer on a light backing fibre by repeated spreading. After drying, and embossing with a leather grain, the material is vulcanised in hot air.

The following mix may be used; the finished embossed leather should be cured for 40 minutes at 100°C.

BASE COMPOUND

	parts by weight
60% Ammonia preserved concentrate	166 „ „
Paper pulp (dry weight)	50 „ „
Zinc diethyldithio carbamate	1 „ „
Sulphur	2 „ „
Zinc oxide	5 „ „
China clay	100 „ „
Brown colour paste (dry weight)	0.5 „ „
Sodium cetyl sulphate 15% paste	25 „ „

TOPPING COMPOUND

	parts by weight
60% Ammonia preserved latex concentrate	166 „ „
China clay	100 „ „
Lithopone	10 „ „
Zinc oxide	5 „ „
Sulphur	2 „ „
Zinc diethyldithio carbamate	1 „ „
Green colour paste (dry weight)	1 „ „
Sodium cetyl sulphate	25 „ „

RECONSTITUTED LEATHER

Reconstituted leather may be made by crushing leather scraps, so that the leather fibres are completely separated each from the other, and then mixing this pulp with a compounded latex. The pasty mass is spread out into sheets, dried until 70 to 80% of the moisture has been expelled, pressed and then completely dried Vulcanisation is carried out by fast curing accelerator combinations at low temperature and may be arranged to coincide with drying. There are very definite limits above which leather should not be heated.

Leather is tanned before use to make it remain supple when dry and to keep it from putrefying. Various methods and

agents are used, so by reason of the variable nature of leather scrap with respect to the tanning agents it contains, their fastness on the fibres and their possible effect on the latex, the manufacturer of reconstituted leather sometimes falls into much difficulty. To avoid such trouble it is better to obtain disintegrated scrap before adding to the latex mix. A good formula is recommended herewith:

Detanned leather fibres	1.83 kg.
Casein solution made with borax	0.25 „
Latex 60%	2.50 „
Sodium thiosulphate	0.20 „
Water	6.20 litres
Sulphonated castor oil	0.25 kg.
Sulphur	0.05 „
Terpene	0.1, „
Zinc oxide	0.05 „
Zinc diethyl dithio carbamate	0.10 „
1% solution of a Sulpho-quinone	0.20 „
Ammonia, Fort	22 „

The fluidity of latex is first increased by the addition of sodium sulphanilate which is stated to emulsify the protective coating which surrounds the latex particles. Care must be used in vulcanisation, since untanned leather will not stand a temperature higher than about 90°C.

Typical of the second sub-division of this class are the processes in which latex is added to an aqueous suspension of wood pulp or cotton fibres and then coagulated on to the fibres by an addition of alum or other suitable coagulant. The rubberised fibres are then separated in a felted condition on a screen, pressed and dried. By the use of fast accelerator combinations no heat treatment may be required other than that used in drying. Otherwise cure must be completed by festooning for a longer period in warm air.

Reconstituted leather may be made by treating leather waste in a similar way. Leather can be made into a fine pulp by heating with water in a machine of the type used by paper makers for dispersing and shortening the fibre length of their wood pulps. A patent has been taken out by International Latex Processes Ltd., to difficulties encountered when latex is mixed with these leather pulps and a sheet is made by straining through a wire gauze. There is a tendency for the product of rubber coagulum and knots of leather fibres. The inventor proposed to adjust the pH value of the leather dispersion to a value between 4.2 and 7.8 so that the leather fibres carry a positive charge. They thus have an affinity for the negatively charged latex particles and 30% of rubber may be bonded to the fibres in this manner.

The converse process, viz., adding compounding ingredients to a negatively charged slurry of fibres and then adding a positive (acid) latex is used in practice and gives very uniform distribution of the rubber of the fibres.

According to a method described for the manufacture of artificial leather suitable for shoe soles and packing materials, leather scrap and asbestos are ground until reduced to an aqueous suspension of the individual fibres without, however, short-individual fibres without, however, shortening their length. Latex is then added and the mixture is coagulated with alum. At this stage, the coagulum flocs are de-watered by compression into a cylindrical mould and the cylinder is then turned in a machine against a cutting blade which peels off a continuous sheet of artificial leather.

Magic Lantern Slides

The making of a good lantern slide begins with the making of the negative, the operation in both cases being closely allied, and he who has mastered the first, which is the corner stone to all successful results in any branch of photography, may well be expected to be able to make a good lantern slide. A slide is judged not by what it appears to be when held in the hand, but by its appearance when magnified two to five thousand times on the screen, where a small defect in the slide will show up as a gross fault. Patience and cleanliness are absolutely necessary. The greatest caution should be observed to keep the lantern plates free from dust, both before and after exposure and development, for small pinholes and dust spots, hardly noticeable on the slide, assume huge proportions on the screen and detract materially from the slide's beauty.

The high lights in a slide should, in rare cases only, be represented by clear glass, and the shadows should always be transparent, even in the deepest part. The balance between these extremes should be a delicate gradation of tone from one to the other. The contrast between the strongest high light and the deepest shadow should be enough to give brilliancy without hardness and delicacy or softness without being flat. This is controlled also, to some extent, by the subject summer sunshine requiring a more vigorous rendering than hazy autumn subjects, and herein each individual must decide for himself what is most necessary to give the correct portrayal of the subject. It is a good idea to procure a slide, as near technically perfect as possible, from some slide-making friend, or dealer, to use it as a standard, and to make slide after slide from the same negative until a satisfactory result is reached.

A black tone of good quality is usually satisfactory for most slides, but it is very agreeable to see interspersed a variety of tone, and beautiful slides can be made, where the subject warrants, in blue, brown, purple, and even red and green, by varying the exposure and development and by using gold or uranium toning baths and other solutions for that purpose the formulas and materials for which are easily obtainable from the magazines and from stock dealers, respectively.

It must be understood, however, that these toning solutions generally act as intensifiers, and that if toning is contemplated, it should be borne in mind at the time of developing the slide, so that it may not finally appear too dense. Toning will improve otherwise weak slides, but will not help under-exposed ones, as its tendency will be in such case to increase the contrast, which in such slides is already too great. Another method of getting a fine quality of slides is to make rather strong exposures to overdevelop, and then to reduce with persulphate of ammonium.

METHODS OF MAKING THE EXPOSURE

The popular methods of making the exposure are: First, by contact in the printing frame, just as prints are made on velox or other developing paper, provided the subject on the negative is of the right size for a lantern slide; and the other and better method is the camera method, by which the subject of any negative, large or small, or any part thereof, can be reduced or enlarged, and thus brought to the proper size desired for the slide. This is quite a knack, and should be considered and studied by the slide maker very carefully.

Hard and inflexible rules cannot be

laid down in this relation. Portrait studies of bust or three-fourth figures or baby figures need not be more for a larger opening that 1½ by 2 inches, and often appear to good advantage if made quite a bit smaller. Figure or group compositions, with considerable back-ground or accessories, may, of course, have a larger opening to suit the particular circumstances. Monuments, tall buildings, and the like should have the benefit of the whole height of mat opening of 2¾ inches, and should be made of a size to fill it out properly providing, however, for sufficient foreground and a proper sky line. Landscapes and marine views generally can be made to fill out the full length of mat opening, which however, should not exceed 2¾ inches, and may be of any height to suit the subject, up to 2¾ inches.

The subject should be well centred on the plate and the part intended to be shown as the picture should be well within the size of the mat opening decided upon, so that with a slight variation of the mat no part of the picture will be cut off by the carrier in the stereopticon. The horizon line in a landscape, and more particularly in a marine view, should always be in proper position, either below or above the centre line of the slide, as may suit the subject but should never divide the picture in the middle and should not appear to be running up or down hill. And the vertical lines in the pictures should not be leaning, but should run parallel with the slide lines of the mat; this refers especially to the vertical lines in architecture, except, however, the Tower of Pisa and kindred subjects, which should in every case be shown with their natural inclinations.

As to time of exposure very little can be said. That varies with the different makes of plates, with the quality of the light, and the nature and density of each individual negative. Therefore every one must be a judge upto himself and make as good a guess as he can for the first trial from each negative and gauge further exposures from the results thus obtained; but this much may be said, that a negative strong in contrast should be given a long exposure, close to the light, if artificial light is used, or in strong daylight, and developed with a weak or very much diluted developer to make a soft slide with full tone values. And a flat, weak negative will yield better results if exposed further from the light or to a weaker light, and developed by a normal or more aggressive developer. Over exposure and under exposure show the same results in slide plates as in negative plates, and the treatment should be similar in both kinds of plates except that, perhaps, in cases of under exposure of slide plates, the better plan would be to cast them aside and make them over, as very little can be done with them. For getting bright and clear effects it is now well understood that better and more satisfactory results are obtained by backing negative plates. This is accomplished by coating the back or glass side of the plate with the following mixture:

Burn sienna	2 ounces
Gum arabic	½ ounce
Caramel	1 ,,
Alcohol	2 ,,

Mix and apply with small sponge or wad or absorbent cotton.

It should coat thin and smooth and dry hard enough so it will not rub off when handled. If the plates are put into a lightproof grooved box as fast as backed, they can be used about half an hour after being coated. Before developing, this backing should be removed; this is best done by first wetting the film side of the plate under the tap, which will prevent staining it, and then letting the water run on the backing, and, with a little rubbing, will disappear in a few moments, when development may proceed. Other

preparations for this purpose, ready for use, may be found at the stock houses. The mat should be carefully selected or cut of a size and shape to shop up the subject to best advantage, and should cover everything not wanted in the picture. The opening should not exceed 2¼ × 2¼ inches in any case, and must not be ragged or fuzzy, but clean cut and symmetrical. The lines of the opening of square mats should be parallel with the outside lines of the plate. Oval, or round or other variously shaped mats, should be used sparingly, and in special cases only where the nature of the subject will warrant their use.

Statuary shows up to best advantage when the background is blocked out. This is easily done with a small camel's hair artist's brush and opaque or India ink, in a retouching frame, a good eye and a steady hand being the only additional requirements. This treatment may also be applied to some flower studies and other botanical subjects.

Binding may be performed with the aid of a stationer's spring clamp, such as is used for holding papers together. Cut the binding strips the length of the sides and ends of the slide, and gum them on separately, rubbing them firmly in contact with the glass with a piece of cloth or an old handkerchief, which might be kept handy for that purpose, so that the binding may not loosen or peel off after the slides are handled but half-a-dozen times. Before storing the slides away for future use they should be properly labelled and named. The name label should be affixed on the right end of the face of the slide as you look at it in its proper position, and should contain the maker's name and the title of the slide. The thumb label should be affixed to the lower left-hand corner of the slide, and may show the number of the slide.

Chemical Magic

Chemistry of to-day might well be called modern magic. The tricks of the ancient magician and alchemists were crude attempts at deception compared to the works of the chemists of the present generation. A few experiments on the art of chemical magic are given here in the hope that some of our sleight-of-hand performers and exponents of the art may find a variety in them.

LIGHTING FIRE WITH ICE

Cut off a very small piece of pure sodium metal and place it in the folds of a sheet of paper, which has been rumpled up in the form of a ball. Place this ball of paper in a metal dish or container. If the water from a piece of ice be allowed to drop on the sodium metal, it will take fire and burn the paper. To be absolutely sure this trick will work, the spot where the sodium metal is placed can be moistened with a bit of petrol. This will ensure the lighting of the paper.

RING MYSTERY

Soak a thread in a strong solution of alum and water, take out and let dry, then soak it again. Repeat, this several times. To all appearance, when dry, there is nothing unusual with the thread. Suspend a length of it from a suitable support ar hang on the end a light ring. Set fire to the other, but it will not break, nor will the ring fall. The thread is really burnt, but not the alum, a little tube of this substance being of sufficient solidity and strength to support the ring. If the thread is prepared in advance of the performance, and a ring borrowed from one of the audience it will make the trick more effective.

SMOKE TRICK

Take two ordinary clean glass tumblers or, if possible, glass bowls. Into one of them put a few drops of muriatic acid, and give the glass a rotary motion, so that the liquid will cover the bottom. Into the other, put a few drops of very strong liquid ammonia and also give this glass a rotary motion for the same purpose, that is, to cause the acid to cover the bottom. Keep the glasses far apart until you are ready to perform the trick. When ready, merely place them mouth to mouth and cover from the front. They begin to smoke immediately. Burning the paper is only to add to the mystery and heighten the illusion of the smoke penetrating into the glasses. Be sure to show the glasses, one at a time, but do not let them come together until quite ready for the presentation of the trick.

WATER TO INK, TO WINE, TO WATER

This trick requires a pitcher and seven wine glasses. Pour enough clean water into the pitcher to fill the seven glasses, and dissolve in it a small amount of tannic acid. Glasses 1 and 3 are unprepared; glasses 2 and 4 contain each a few drops of iron chloride; glass 5, about ten drops of oxalic acid solution; glass 6, ten drops of ammonia, and glass 7, about a teaspoonful of sulphuric acid. When filled from the pitcher, the first glass appears as water, the second as ink, the third as water, and the fourth as ink. Return the contents of these four glasses to the pitcher and from it, now fill six of the glasses and the contents of the first four will be ink-coloured, the liquid in the fifth will be like water and that in the sixth will be like port or claret in colour. Pour back the contents of all six glasses into the pitcher and now from it fill seven of the glasses; in this case, the liquid in six will be the colour of port, while that in the seventh will appear as water.

Lastly empty all seven back into the pitcher, from which refill them; the liquid in each of the seven will then look into ordinary water.

WINE AND WATER TRICK

Nine glasses and a transparent pitcher are required for this trick. Prepare the nine glasses as follows:— 1, no preparation; 2, three drops of caustic soda solution; 3, no preparation; 4, three drops of caustic soda solution; 5, no preparation; 6, three drops of caustic soda solution; 7, two drops of sulphuric acid; 8, six drops of caustic soda; 9, eight drops of sulphuric acid. In the pitcher, put nine glasses of water and ten drops of phenolphthalein solution. Place the glasses in a row in numerical order, thus, 1, 2, 3, 4, 5, 6, 7, 8, 9. From the pitcher fill the first glasses and the liquid in each will appear as wine; empty all back into the pitcher, and next fill seven glasses in order, and all seven will appear to contain water; then fill the eighth glass and the liquid in it will seem as wine; now pour what is in the eight glasses back into the pitcher, and from it, this time, fill the same eight glasses and you will find the contents of seventh the colour of wine and the contents of the eighth the colour of water. Again pour back the contents of the eight glasses, and lastly, fill all nine, and the liquid in each will have the appearance of water.

Preparation of Fruit Preserves

Fruit preserves are whole fruits or pieces of large fruits preserved in a heavy syrup. They differ from canned fruits in both the amount of sugar required and in the method of manipulations. The fruit in a good preserve should be plump, tender, and the quality and flavour should not be masked by excess of sugar. Technically, a preserve should be in a syrup of not less than 60 to 65 per cent sugar but many fruits will make more satisfactory preserves if the syrup is approximately 50 per cent sugar

PRINCIPLE OF MANUFACTURE

The making of fruit preserves depends upon the physical phenomenon known as osmosis, namely, that where two liquids, one or both of which carry some crystalline substance in solution, are separated by a suitable membrane there is a movement of liquids through this membrane which movement continues until both liquids have reached equilibrium, that is, they are both of the same density. The movement of liquid is always more rapid from the less dense to the denser liquid and the rate of movement is proportional to the differences in densities.

This principle of osmosis applies to the making of preserves in the following manner: The fruit to be preserved is properly prepared and is placed in a sugar syrup whose density is somewhat greater than that of the fruit juice. Two effects will be noticed: (1) the fruit, especially if soft, becomes somewhat shrunken and flaby due to the more rapid flow of the less dense fruit juice through the cell walls into the denser syrup; (2) the syrup becomes less dense—less sweet as shown by both taste and by the saccharometer. However, in the course of a few hours the fruit will resume its normal plump condition. Examination will show that the fruit is sweeter and the syrup less sweet than when the process began. If this syrup has its density increased, either by addition of more sugar or by concentration of the syrup, and is then poured over the fruit same changes as noted above will take place again. In this way by slow stages it is possible to produce fruit preserves having a sugar content of 65 per cent or even more. If, however, at any stage of the process, especially at the beginning, the syrup is too dense, the flow of juice from the fruit may be so rapid as to rupture or collapse the cells in some fruits, notably, pears, apples and quince. Under these conditions osmosis will practically cease except that the dense syrup will "draw" the juice from the fruit, leaving it shriveled and tough.

Storing Preserves. — Preserves should be stored in small hermetically sealed jars, preferably half or quarter pints. They are so rich in sugar as to be eaten only sparingly and while they will keep in paraffined glasses provided syrup is at least 65 per cent sugar, they are more satisfactory if they are made less sweet and are stored in sealed jars. Some preserves such as cherries and strawberries develop a large amount of froth in the jars if they are processed at boiling temperature. More satisfactory results may be made by processing products at 180° to 190°F. for 10 minutes for half-pint size jars.

CANTALOUPE OR MUSKMELON PRESERVES

The melons should be ripe but firm. The rind is removed and the firm pulp is cut into pieces of desired size and shape. The prepared material is weighed and $\frac{3}{4}$ pound of sugar is allowed for each pound of melon. The melon and sugar are packed in alternate layers and allowed to stand for 24 hours. At the end of this period the juice from one small lemon per pound of melon is added and the materials are set over a slow fire. Slow boiling is maintained until the syrup sheets or flakes from the stirring spoon.

The hot preserve is filled into clean jars and is processed in the water bath for 2 or 3 minutes.

CHERRY PRESERVES

Sour cherries are excellent for preserves. The pits should be carefully removed in order to retain the fruit whole. A thin hairpin, a loop of small wire or a paper clip may be used for effectively pitting the fruit. The syrup is made by allowing $\frac{3}{4}$ cup of sugar and $\frac{1}{3}$ cup of water per quart of cherries. When the sugar is dissolved in the water the pitted cherries are added and heated slowly with constant stirring to a simmer temperature for about one minute. As the fruit cools it should be stirred frequently to dissolve the froth and foam. The fruit is set aside preferably in a shallow pan in a sunny window for one day. The pan of fruit is then heated slowly to boiling and boiled gently for one minute. The froth is again stirred in as it cools and the fruit is returned to the sunny window.

When the syrup becomes as heavy as desired and the cherries are plump they are packed into clean, dry jars and processed for one or two minutes in the water bath, or pasteurized for 10 minutes at a temperature of 180° to 190°F. If cherries show a tendency to shrivel and become tough they were not cooked enough during the first cooking period. If they tend to break up they were cooked too much.

CRANBERRY PRESERVES

The cranberry preserve has a wider range of usefulness than any other preserve. It may be eaten as a preserve, substituted for maraschino cherries, used as a filler for bonbons of chocolate candies. They require a little more work but they are well worth the labour they demand.

The large berries are more satisfactory. Each berry should be vented, that is, some small instrument like a toothpick, wire paper clip, or bodkin is thrust through the berry so as to pierce the cavity at the centre of the fruit. This vent will permit the enclosed gas to escape during heating without bursting the fruit. There are two methods of procedure in preserving cranberries: (1) use of vacuum, and (2) heating.

Vacuum Method. — The vented berries are filled into one-quart or two-quart jars and covered with syrup made by dissolving one pound sugar in one quart water. The hot syrup is poured over the berries, filling the jars full. The jars are allowed to remain in the cooker for several hours. When the jars are removed they are refilled with syrup and set aside for one or two days. The syrup is drained from the fruit and $\frac{1}{2}$ pound of sugar per quart of syrup is added. The syrup is heated to boiling and poured over the fruit. Excess syrup should be saved in separate jars. Two days later this procedure is repeated. After two or three days the excess syrup is added to the drained syrup and the mixture is boiled down to just enough to fill the jar. The jar is sealed and stored. Preserves are ready for use within two to four days. They should be firm, plump and not over sweet.

Heating Method.—If a pressure cooker is not available the heating method must be used. There are several ways in which this may be accomplished but perhaps the simplest is as follows: The prepared berries are filled into the glass jars and the boiling syrup made as directed above is poured over them. After one or two hours the syrup is drained off, heated to boiling and returned to the fruit. This operation should be repeated two or three times at intervals of one to two hours. The purpose of this initial process is to soften the berries without bursting them and to expel the gas from the fruit and replace it with syrup. Failure to cook the fruit sufficiently will result in a large per cent of "mummies"—dry, hard, shriveled berries.

After the syrup has been heated three or four times and poured over the fruit the process continues as directed under. "Vacuum Method", beginning at the first operation after fruit is removed from the pressure cooker.

Steam Heating Method.—Another method is to place the prepared fruit in shallow pans and pour over the berries a hot syrup made as follows: For each quart of berries 1 pound of sugar is heated to solution in ½ cup of water. The berries and syrup are placed in a steamer and steamed for 30 to 45 minutes. After standing 2 or 3 days in a warm, dry room the preserves are ready to use.

ORANGE PRESERVES

Medium-sized seedless oranges are preferred. As a general rule the outer skin containing the oil sacs is removed by grating or paring with a sharp knife.

Three or four holes are then cut through the skin into the pulp of the orange. These holes are about ½ inch in diameter and should be evenly spaced around the middle of the fruit. The holes function as vents and prevent bursting of skin during cooking.

The prepared fruit is cooked in a syrup of 1 pound sugar per quart of water using enough syrup to float the fruit in the cooking vessel. The cooking should be at slow boiling in a covered vessel and just long enough to make the fruit tender. After standing a day or two the syrup is drained from the fruit and a half-pound of sugar per quart of syrup is added. This syrup, boiling hot, is poured over the fruit and allowed to stand for two or three days. If fruit is not sweet enough repeat the above process. A maraschino cherry or a preserved cranberry may be placed in each vent in the orange as they are packed into clean, dry jars and if desired the fruits may be covered with "grenadine" syrup instead of the plain sugar syrup. The packed preserves are processed for 30 to 40 minutes in the water bath.

PEAR PRESERVES

The fruits should be hard-ripe If soft they will go to pieces; if green they will lack quality. They are peeled and if large, like Bartlett of Bosc, they may be halved and cored or if desired they may be cut into smaller pieces. If small, like the Seckel pear, they may be left entire. As soon as peeled the fruit is placed in a weak brine (1 tablespoonful of salt per quart of water) until all the fruit is prepared.

The fruit is rinsed in clear water and is then boiled slowly in a very light syrup (½ cup sugar per quart water) until tender. This water is drained from the fruit and is made up to one pint for each pound of fruit by adding more water. Sugar is added at the rate of 8 ounces for each pound of fruit. Heat is applied to dissolve the sugar and the syrup is brought to the boiling point. The hot syrup is poured over the fruit and it is set aside for one

or two days. The syrup is then drained from the fruit and 4 ounces of sugar per pound of fruit is added to the syrup, which is heated to boiling and again poured over the fruit. At the end of the second or third day the syrup is again drained from the fruit, measured and concentrated to two-thirds its volume by rapid boiling. After standing two or three days in this syrup the preserves should be about as sweet as desired and they are ready to be packed. If sweeter preserves are desired the syrup may be drained and concentrated to two-thirds its volume and poured over the fruit, which should stand two to four days before filling into containers.

When the preserves are as sweet as desired they are packed tightly into clean glass jars, the syrup is heated to boiling, and poured over the packed fruit filling the jars full. The jars are partially sealed and are processed in the water bath at boiling temperature for 2 or 3 minutes.

PEACH PRESERVES

Peaches are peeled and may be preserved whole, in halves, or in slices. The method is identical with that given for pears.

PLUM PRESERVES

Some varieties of plums make exceptionally well-flavoured preserves. They should be sub-acid to tart and only firm-ripe. Only those varieties having a fairly firm flesh are adapted to this method of making preserves. Burbank, most varieties of the Green Gage group and the Prune types of the European plums are all suitable for preserves.

The skins may be removed or not, according to taste. The quality is perhaps higher if the skins have been removed but the plums are more difficult to handle; because there is greater danger that they will break up. If the fruit is ripe the skins may be readily stripped off of some varieties. Others will require blanching in boiling water (30 to 40 seconds) followed by cooling in cold water.

As a general rule the plums are pitted. This is relatively simple if the fruit is freestone. A cut is made around the fruit along the suture line. A slight twist separates the fruit into stone the flesh may be cut from the pit in almost perfect halves by using a knife with a curved blade similar to a grapefruit knife. The cut is made in the same plane as the suture line and as close to the pit as possible. When one half has been cut away the pit may be readily cut from the other half.

The prepared fruit should be placed in a salt solution (1 tablespoonful of salt per quart of water). A syrup is made by heating the solution equal parts of sugar and water. From ½ to ¾ pound of sugar per pound of fruit will generally be sufficient. The ration of sugar will vary with the acid taste of the fruit. The fruit is removed from the salt solution, rinsed in clear water and placed in the syrup. Heat is applied to bring the syrup to the simmer or to approximately 200°F. for 2 or 3 minutes. The vessel is then set aside for 12 to 24 hours. It is then brought to boiling and boiled moderately, without stirring for 2 minutes. When cool the fruit and syrup are transferred to shallow pans and placed in the "sun cooker" or left in warm, dry room until the fruit is plump and the syrup has become almost jellylike.

Best results are had when the fruit is handled in small batches of not more than two or three pounds. An occasional stirring during the period of standing will hasten the process. The pans must not be covered.

The finished preserves are filled into dry jars partially sealed and processed

in the water bath at 180°F. for 20 minutes.

STRAWBERRY PRESERVES

The strawberry makes one of our most popular and delicious preserves. The fruits should be of medium size, well ripened and of a variety that is red throughout. Large, overgrown and soft berries should not be used for preserves. The best quality and appearance are secured by the sun-cooked method. Very excellent results, however, may be had if one does not have facilities for "sun-cooking".

The berries are hulled and washed in cold water. The fruit is weighed and placed in shallow enamelled pans, allowing one to two pounds of fruit for each pan. Sugar at the rate of ¾ pound per pound of fruit is spread evenly over the fruit. The pan is covered and set aside for several hours, usually overnight. During the standing period the sugar will cause some of the juice to flow out from the fruit and at the end of the standing period much of the sugar will be in solution. The pans are set over a slow fire and heated with just enough stirring to loosen the sugar from the bottom of the pan. When the sugar is all in solution more heat is applied. When the pan of syrup boils throughout while being gently stirred the fruit is said to be boiling. It is then boiled for one minute. The pan is removed from the fire and allowed to cool. If stirred occasionally while cooling the froth and foam will go into solution leaving the syrup and berries clear and sparkling.

The pans of berries are set in the sun cooker and left there with occasional stirring until the syrup is thick and the berries are plump. Or the pans may be set in a sunny window and stirred a few times each day for two to four days or until the syrup is of desired density. Preserves made in this way have the maximum aroma and flavour of fresh fruit. Their colour is a bright, attractive red, while the fruits are large, plump and tender. The "sun cooker" saves some time and gives a little brighter colour. If the berries shrivel or become tough it means that the initial cooking period was too short. Strawberries may be made into preserves by the same method as given for pears, but they will not as a rule be as satisfactory as the "sun cooker" preserves.

When the preserves are finished they are packed into clean dry, jars partially sealed and processed for one or two minutes in the water bath; or pasteurized at 180-190°F. for 10 minutes for half-pint jars.

QUINCE PRESERVES

The quince produces one of our most attractive and best flavour preserves. In order to secure the beautiful dark red colour it is necessary to vary the general method somewhat, since the colour is developed only through long cooking.

In preparing the quince care must be used to remove all the gritty material from around the core. The fruit may be left in halves or cut into thin slices.

The syrup is made by using 8 ounces of sugar and 1 quart of water for each pound of prepared fruit. The fruit is cooked in the syrup at slow boiling for one hour or until a decided red colour has developed. After standing for 24 hours the syrup is drained from the fruit and 4 ounces of sugar per pound of fruit is added. The syrup is brought to the boiling point, and poured over the fruit. After one or two days the fruit in the syrup is set over a slow fire and gently simmered or slowly boiled until colour of density has developed. After standing two days the syrup is drained and boiled rapidly to jelly test. While the syrup is boiling the fruit is packed into clean, dry jars and the hot syrup, when finished, is poured over the fruit.

The jars are partially sealed and processed in a water bath for two or three minutes. The preserves should be clear, tender, plump and of a deep red colour. The syrup should set to form a soft jelly.

TOMATO PRESERVES

The pear, plum or peach types of tomatoes are best suited for making preserves. Both the red and yellow tomatoes may be used. They may be made as pure tomato preserves or the flavour may be modified with a few thin slices of lemon. The tomatoes should be just ripe—neither green nor soft. They are blanched 15 to 30 seconds or just long enough to cause the rinds to slip easily. When removed from the blanching water they must be cooled at once in cold water. The skins are removed but as a rule the core is not cut out as in canning. For each pound of prepared tomatoes 1 pound of sugar and ½ cup of water are required. The sugar is dissolved in the water and heated to boiling. The tomatoes are added to the boiling syrup and gently boiled until fruits are tender. They are then set aside for 24 hours. The syrup is drained and measured and is concentrated to two-thirds of the measured volume and poured while hot over the tomatoes. After standing 24 hours the syrup is again drained and concentrated until it will give a jelly test. The preserves are packed into clean, dry jars, filled with the hot syrup and processed for one or two minutes in the water bath.

Preserves may be made from the small varieties of tomatoes by using the sun-cooked method given for strawberry preserves. The tomatoes are blanched to remove the skins.

WATERMELON RIND PRESERVE

The watermelon rind is cut into half-inch or inch strips and the peel and inner pink pulp are removed. These strips may then be cut into suitable size pieces, usually half-inch squares. The prepared rind should be allowed to stand overnight in a weak brine (¼ cup salt per gallon of water). The next day the rind is freshened by standing for one hour each in two or three changes of clear water or by parboiling for two or three minutes in two changes of clear water.

The freshened rind is boiled in water (1 pint for each pound of rind) until tender. The water is drained from the rind, strained through cheesecloth and made up to 3 cups per pound of material by addition of water. One cup of sugar per pound of rind is added to the water and this syrup is brought to boiling and poured, while hot, over the cooked rind. After standing 24 hours the syrup is drained off and ½ cup sugar and the juice from one-half lemon are added for each pound of rind. The syrup is brought to boiling and returned to the preserve. After standing for two or three days the preserves are packed into clean, dry jars; the syrup is concentrated until it sheets from the spoon before filling into the jars. The packed preserves should be processed for one or two minutes in the water bath.

THE SUN COOKER

This device for finishing preserves consists essentially of a box with a sloping cover of glass. It may be attached to the south side of a building or it may be set up in the yard. In the latter case it is supported above the ground on substantial legs. A band of cloth soaked in oil tied about each leg will discourage attack of ants and other creeping insects.

The cooker may be constructed as follows: Its length and width should correspond in size to any available window sash. The sides are nailed securely to the bottom. They should

taper from ten or twelve inches at the back to five or six inches at the front. The back may be fastened to the bottom and sides or it may be hinged to the bottom so that it may be used as an opening into the cooker through which the products may be handled into and from the cooker. The greater part of the front should be left open for ventilation. The opening must be screened to exclude insects. The glazed window sash should fit closely over the top to form a tight cover. It may be held in place by screw and hooks.

When set up for use the end designated as "front" above is placed toward the south. This position will allow the rays of the noon sun to fall almost perpendicularly upon the glass cover.

The sun cooker works upon the principle that solar energy readily passes through glass while heat energy escapes slowly through glass or wood. Therefore the result is the accumulation of heat within the cooker. On clear, summer days the temperature inside a well-constructed sun cooker may rise to 150° to 160°F. This high temperature causes a rapid concentration of the syrup in the pans of fruit within the cooker so that only a few days of clear weather are required to finish the preserves.

The operation of the cooker is very simple. The fruit after receiving its initial preparation is placed in shallow pans. The pans are placed in the cooker and left there until the syrup has become sufficiently concentrated and the fruit is quite plump. A thorough stirring of the fruit in the pans two or three times each day will not only hasten the process but will improve the quality of the preserves.

The finished preserves are filled into glass jars and processed in the water bath for 3 to 5 minutes.

Scientific Researches and Inventions

GLUTAMIC ACID MAKES THE OLD MORE ACTIVE

Older people get more zest for life and are more active when given glutamic acid according to a statement made by Dr. H. E. Himwich of the Galesburg, Illinois, State Research Hospital.

Glutamic acid is an amino acid, one of the so-called "building blocks" contained in protein. It was given, in a series of tests, to 27 elderly patients in the Illinois hospital.

"Of the 27 patients who completed this study, 17 improved," Dr. Himwich reported. Among these 17, the most consistent effect was an increase in activity. Not only did they do better on their jobs, but they showed more interest in the work.

"The next biggest improvement was in their emotions and outlook on life. Twelve of the 17 patients became more optimistic and cheerful and appeared to enjoy life more. Thus in this small number of patients there appeared to be increased activity and zest in life associated with the feeding of glumatic acid."

SILICONE FINISH FOR WOOLLEN CLOTHS

The natural advantages of wool can be greatly enhanced by treating them with a silicone finish, according to the Dow Corning Corporation, a U.S. chemical concern. A new silicone finish developed by the company is said to give woollen fabrics long-lasting ability to repel water, increased resistance to stains and increased ability to retain creases after being pressed. The finish also makes woollen and wrosted fabrics wear better and longer, it is claimed.

POSSIBLE CURE FOR MUSCULAR DYSTROPHY

Potassium, better known as a fertiliser ingredient than as a cure for bodily ills, may offer hope for sufferers from the crippling disease known as muscular dystrophy, according to a group of doctors representing the University of California at Los Angeles medical school. The doctors believe that a cellular defect results in potassium leaking out of muscle cells, and that this loss affects muscle function. It may be feasible to administer potassium to make up the loss, the doctors say, but the unsolved problem is how to insure retention of the extra potassium by the cells.

"CLEAR IMAGE" LENS RESTORES SIGHT TO THE PARTIALLY BLIND

The "clear image" glasses were demonstrated recently to the Kentucky Optometric Association by their inventor, a professor at California University. Six students at the Kentucky School of the Blind said they could see much better after being fitted with the special glasses.

One boy 13-year-old David Earl Hall of Mill Creek, Kentucky, said his vision was so improved that he hopes to go back to reguar school soon. His case is one of 2,000 where eyesight has been improved by as much as 9 per cent.

The "clear image" lens, a member of the microscopic lens family, is the first device to remove all the blur optically possible from the eyes of the partially blind. The inventor explains the principle this way: "For the first time the principles of aspherical surfaces are employed as an aid to the human eye. These surfaces are departures from the

spherical surfaces found in ordinary spectacles or magnifying glasses.

Thus, instead of being curved like a ball or sphere, the new lens is slightly flattened or parabolic (aspherical) toward the edges. Patients who never before viewed television clearly can now see the TV screen with maximum clarity. They can read newspapers, magazines and books, while without the lens they must depend on the eyes of others. After being fitted with the lens, many patients who had been treated as blind carry out their daily routines without any assistance.

The inventor said he got the idea for the shape of the lenses by watching the grinding of 200-inch lenses of the Palomar Observatory telescope in California. He estimates that half of all the partially blind persons in the United States—people with eye defects due to accidents, disease or birth—can benefit from using his lenses. He is now touring the nation, teaching optometrists how to fit the lenses to patients.

VERSATILE METAL ONLY

The development of a new and versatile heat-resistance metal alloy, which eventually may become "almost as common as iron," has been announced by the U. S. Naval Ordnance Laboratory at Washington.

Made of aluminium and iron, the new alloy, called Thermenol, may be used in items ranging from electric toasters to jet engines and airplane parts. It is light in weight and has high resistance to heat, oxidation and chemical corrosion. Thus, it appears likely that it may take the place of many present high-temperature alloys.

Thermenol is of particular value since it does not need the relatively scarce metals such as cobalt, nickel and chromium that are used in other high-temperature alloys. In addition, its electrical sensitivity is 50 per cent higher than that of the nickel-chromium alloy used in electrical appliance heating elements. This should make it valuable in such appliance as toasters, hot plates, coffee makers and electric stoves.

GLAUCOMA AID REPORTED

An experimental drug called "diamox" is proving "most exciting" in the treatment of the serious eye disease, glaucoma, it was recently reported to the U. S. National Society for Prevention of Blindness.

Dr. Bernard Becker, ophthalmologist of Washington University, at St. Louis, Missouri, said that the new drug, given in the form of pills, seems to be effective in checking glaucoma. The pills keep down the pressure within the eye which,if unchecked, leads eventually to blindness.

In some cases, Dr. Becker explained, the pills were used to reduce pressure before operations needed to check the disease. In other cases, he said, the drug made an operation unnecessary.

NATURAL TEETH FILLINGS

Instead of using gold, silver amalgam or porcelain, dentists of the future may use materials that allow calcium and phosphate mineral crystals to grow into the teeth, two Brooklyn, New York, doctors recently reported.

These men believe they have synthesized in a test the chemical ingredients responsible for mineral deposition in teeth. The synthesis was accomplished by combining collagen, a protein found in the bone and skin and widely used in the manufacture of gelatin, with a solid, insoluble substance called chondroitin sulphate. This latter is believed to be a promoter of chemical processes in the body, similar to the enzymes.

OINTMENT FOR SORE NIPPLES

Tincture of tolu	2	dr.
Spermaceti ointment	½	oz.
Powdered gum	2	dr.

Mix well to make an ointment.

SEA-SICKNESS TABLETS

I

Ammonium bromide	6	oz.
Cocaine hydrochloride	½	,,
Simple syrup	q.s.	

Make 3 gr. tablets.

II

Chlor. butol	5	gr.

Make 5 gr. tablets.

REMEDIES FOR INSECT BITES

I

Carbolic acid	15	gr.
Glycerine	2	dr.
Rose water	4	oz.

II

Salicylic acid	15	gr.
Collodion	2½	dr.
Spirit of ammonia	5½	,,

III

Fluid extract rhustoxicodendron	1	dr.
Water	8	oz.

IV

Ipecac, in powder	1	dr.
Alcohol	1	oz.
Ether	1	,,

V

Betanaphthol	30	gr.
Camphor	30	gr.
Lanolin cold cream	1	oz.

TINCTURE OF IODINE

Iodine	100	gr.
Potassium Iodide	60	,,
Distilled water	10	,,
Alcohol (90%) sufficient to produce	1000	c.c.

The potassium iodide and iodine are dissolved in the distilled water. Finally add alcohol to produce the required volume.

PARAFFIN OINTMENT

Hard paraffin	27	parts
Soft paraffin	70	,,
White beeswax	3	,,

Melt together over slow fire. Then remove from the source of heat. Continue stirring until solidified.

SULPHUR OINTMENT

Sublimed sulphur	10	parts
Benzoated lard	90	,,

Triturate the sulphur with lard gradually until smooth.

CREOSOTE OINTMENT

Creosote oil	10	parts
Hard paraffin	40	,,

Add creosote oil to the melted paraffin. Stir until cold.

ACETATE OF LEAD OINTMENT

Mix 1 oz. acetate of lead to 20 oz. of paraffin ointment.

COLD & INFUENZA MIXTURE

I

Ammon. acetate solution	1	fl. dr.
Spirit of nitrous ether	30	min.
Tincture of aconite	3	,,
Tincture camphora co.	20	,,
Spt. Ipecacuanha	10	,,
Chloroform water to	1	fl. oz.

Mix well. This makes one dose.

II

Potassium citrate	30	gr.
Potassium nitrate	5	,,
Spt. Ipecacuanha	10	min.
Spirit of Chloroform	10	,,
Syrup of Squill	½	fl. dr.
Anise water to	1	fl. oz.

Dose: 1 fl. oz.

Recipes for Small Manufacturers

SKIN LOTION

Zinc sulphocarbonate	30 gr.
Alcohol (90 per cent)	4 fl. dr.
Glycerine	2 fl. dr.
Tincture of cochineal	1 fl. dr.
Orange flower water	1½ fl. oz.
Rose water (triple) to make	6 oz.

BARBER'S POWDER

Corn starch	5 lb.
Precipitated chalk	3 ,,
Powdered talc	2 ,,
Oil of neroli	1 dr.
Oil of cedrat	1 ,,
Oil of orange	2 ,,
Extract of Jasmine	1 oz.

VINEGAR FOUGE

Acetic acid	24 parts.
Alum	3 ,,
Peru balsam	1 part.
Carmine, No. 40	12 parts.
Ammonia water	6 ,,
Rose water, distilled	575 ,,
Alcohol	1,250 ,,

Dissolve the balsam of Peru in the alcohol, and the alum in the rose water. Mix the two solutions, add the acetic acid, and let stand overnight. Dissolve the carmine in the ammonia water and add to mixture. Shake thoroughly, let stand for a few minutes, then decant.

BEAUTY WATER

Fresh egg albumen	500 parts.
Glycerine	50 ,,
50% Alcohol	25 ,,
Lemon oil	2 ,,
Lavender oil	2 ,,
Oil of thyme	2 ,,

Mix the ingredients well together. When first mixed the liquid becomes flocculent, but after standing for 2 or 3 days clear up sometimes becomes perfectly clear, and may be decanted.

ARTIFICIAL GOLD

Copper	90 parts.
Gold	2½ ,,
Aluminium	7½ ,,

Melt the copper and the gold in a crucible composed of refractory material or of a mixture of unburnt fire-clay and dust of fire bricks, glass pots or seggars and when the metals are fluid the aluminium is added. When not more than 2 lbs. of the alloy are made at a time the mass is kept in a fuse state for half an hour, about 1¾ oz. of borax being added as a flux. The melted mass is then poured into ingots.

BOILER COMPOUND

Soda ash	87 oz.
Trisodium phosphate	1 ,,
Starch	1 ,,
Tannic acid	2 ,,

Use powdered materials, mixing well and then pass through a fine sieve.

CANDLES

Paraffin wax	30 oz.
Stearic acid	17½ ,,
Beeswax	2½ ,,

Melt together and stir until clear. If coloured candles are desired a pinch of any wax soluble dye is dissolved at this stage. Pour into moulds vertical in which wicks are hung.

CHARCOAL BRIQUETTES

Powdered charcoal is mixed in following proportion and pressed and dried.

Charcoal	1000 kilogram
Glue	20 ,,
Sodium nitrate	7 ,,
Gelatin, bone	½ ,,
Water	105 litre

Formulas, Processes & Answers

IOE POLISH (Black)

Carnauba wax	5½ oz.
Crude montan wax	5½ oz.

Melt together in a double boiler (the iter in other container should be at a il) then stir in the following melted and ssolved mixture:

Stearic acid	2 oz.
Nigrosine base	1 „

ien stir in

Ceresin	15 „

Remove all flames and run in slowly, iile stirring

Turpentine	90 fl. oz.

Allow mixture to cool to 105°F. and ur into air-tight tins which should be lowed to stand undisturbed over night.

JTO POLISH (Clear Oil Type)

Paraffin (mineral) oil	5 pt.
Raw linseed oil	2 pt.*
China wood oil	½ pt.
* Benzol	¼ pt.
Kerosene	¼ pt.
Amyl acetate	1 lb.

Shake together in a glass jug and keep oppered.

* Inflammable—Keep away from imes.

JTO AND FLOOR WAX (Paste Type)

Yellow beeswax	1 oz.
Ceresin	2½ oz.
Carnauba wax	4½ oz.
Montan wax	1¼ oz.
* Naphtha or mineral spirits	1 pt.
* Turpentine	2 oz.
Pine oil	½ oz.

Melt the waxes together in a double iler. Turn off the heat and run in the st three ingredients in a thin stream and ir with a fork. Pour into cans; cover and low to stand undisturbed overnight.

* Inflammable.

FURNITURE POLISH (Oil and Wax Type)

Thin paraffin (mineral) oil	1 pt.
Carnauba wax, powdered	¼ oz.
Ceresin wax	½ „

Heat together until all of the wax is melted. Allow to cool and pour into bottles before mixture turns cloudy.

POLISHING WAX (Liquid)

Beeswax, yellow	1 oz.
Ceresin wax	4 „

Melt together and then cool to 130°F.; turn off all flames and stir in slowly.

* Turpentine	17 fl. oz.
Pine oil	½ fl. oz.

* Inflammable.

FLOOR OIL

Mineral oil	46 fl. oz.
Beeswax	½ oz.
Carnauba wax	1 oz.

Heat together in double boiler until dissolved (clear). Turn off flame and stir in

* Turpentine	3 fl. oz.

* Inflammable.

LUBRICANTS

Lubricants in the form of oils or greases are used to prevent friction and wearing of parts which rub together. Lubricants must be chosen to fit specific uses. They consist of oils and fats often compounded with soaps and other unctuous materials. For heavy duty heavy oils or greases are used and light oils for light duty.

GUN LUBRICANTS

White petrolatum	15 oz.
Bone oil (acid free)	5 oz.

Warm gently and mix together.

GRAPHITE GREASE

Ceresin	7	oz.
Tallow	7	„

Warm together and gradually work in, with a stick

Graphite	3	oz.

Stir until uniform and pack in tins when thickening begins.

PENETRATING OIL

(For freeing rusted bolts, screws, etc.)

Kerosene	2	oz.
Thin mineral oil	7	oz.
Secondary butyl alcohol	1	oz.

Shake together and keep in a stoppered bottle.

MOULDING MATERIAL

White glue	13	lb.
Rosin	13	lb.
Raw linseed oil	1/3	qt.
Glycerin	1	qt.
Whiting	19	lb.

This mixture is prepared by cooking the white glue until it is dissolved. Then cook separately the rosin and raw linseed oil, and glycerin to the cooked glue, stirring in the whiting until the mass makes up to the consistency of putty. Keep the mixture hot.

Place this putty mass in the die, pressing it firmly into the same and allowing it to cool slightly before removing. The finished product is ready to use within a few hours after removal. Suitable colours can be added to secure brown, red, black or other colour.

In applying ornaments made of this composition to a wood surface, they are first steamed to make them flexible; in this condition they can be glued to the wood surface easily and securely. They can be bent to any shape, and no nails are required for applying them.

GRAFTING WAX

Wool grease	11	oz.
Rosin	22	„
Paraffin wax	6	„
Beeswax	4	„
Japan wax	1	„
Rosin oil	9	„
Pine oil	1	„

Melt together until clear and p[...] into tins. This composition can be ma[...] thinner by increasing the amount of ro[...] oil and thicker by decreasing it.

ADHESIVES

Adhesives are sticky substances us[...] to unite two surfaces. Adhesives a[...] specifically called glues pastes, cemen[...] mucilages, lutes, etc. For different us[...] different types are required.

ANTISEPTIC POWDER

Boric acid	50	part
Salicylic acid	50	„
Dragon's blood	20	„
Calcium carbonate	1,000	„
Essence spearmint	12	„

Reduce the dragon's blood and calcium carbonate to the finest powder, and mix the ingredients thoroughly. The powder should be used twice a day, or even oftener, in bad cases. It is especially recommended in cases where the enamel has bcome eroded from the effects of iron.

MENTHOL TOOTH POWDER

Menthol leaves a cool and pleasant sensation in the mouth, and is excellent for fetid breath. It may be added to most formulas by taking an equal quantity of oil of wintergreen and dissolving in alcohol.

Menthol	1	part
Salol	8	parts
Soap, grated fine	20	„
Calcium carbonate	20	„
Magnesia carbonate	60	„
Essential oil of mint	2	„

Powder finely and mix. If there is much tartar on the teeth it will be well to add to this formula from 10 to 20 parts of pumice, powdered very finely.

...TH POWDER FOR CHILDREN

Magnesia carbonate	10	parts.
Medicinal soap	10	,,
Sepia powder	80	,,

Peppermint oil, quantity sufficient to ...

...VOURINGS FOR DENTIFRICE

Sassafras oil, true	1	dr.
Pinus pumilio oil	20	min.
Bitter orange oil	20	,,
Wintergreen oil	2	,,
Anise oil	4	,,
Rose geranium oil	1	,,
Alcohol	1	oz.

Use according to taste.

...UID DENTIFRICES & TOOTH WASH

The liquid tooth preparation "Sozo-...t" is said to contain: Soap powder, 60 ...ts; glycerine, 60 parts; alcohol, 360 ...ts; water, 220 parts; oils of peppermint, aniseed, of clover, and of cinnamon, 1 ...t each; oil of wintergreen, 1.200 part.

...RRH TOOTH PASTE

Precipitated chalk	1	oz.
Orris	8	,,
White castile soap	2	,,
Borax	2	,,
Myrrh	1	oz.

Glycerine, quantity sufficient.

Colour and perfume to suit.

A thousand grams of levigated ...vdered oyster shells are rubbed up ...h 12 drachms of cochineal to a homo-...eous powder. To this is added 1 ...chm of potassium permanganate and 1 ...chm boric acid and rubbed well up. ...am up 200 drachms castile soap and 5 ...chms chemically pure glycerine and ... it with the foregoing mass, adding by ...spoonful 150 grams of boiling strained ...ey. The whole mass is again ...oughly rubbed up, adding while doing ...200 drops honey. Finally the mass ... be put into a mortar and pounded for an hour and then kneaded with the hands for 2 hours.

TABLETS FOR ANTISEPTIC MOUTH WASH

Heliotropine, 0.01 part; saccharine, 0.01 part; salicylic acid, 0.01 part; menthol, 1 part; milk sugar, 5 parts.

These tablets may be dyed green, red, or blue, with chlorophyll, eosine, and indigo carmine, respectively.

BLUE SANITARY POWDER

Powdered alum	2	lb.
Oil of eucalyptus	12	oz.
Rectified spirits of tar	6	,,
Ultramarine blue (common)	¼	,,
Common salt	14	lb.

Mix alum with about 3 pounds of salt in a large mortar, gradually add oil of eucalyptus and spirits, then put in the ultramarine blue, and lastly remaining salt, mixing all well, and passing through a sieve.

PINK CARBOLIZED SANITARY POWDER

Powdered alum	6	oz.
Powdered green copperas	5	lb.
Powdered red lead	5	,,
Calvert's No. 5 carbolic acid	12½	,,
Spirit of turpentine	1½	,,
Calais sand	10	,,
Slaked lime	60	,,

Mix carbolic acid with turpentine and sand, then add the other ingredients, lastly the slaked lime and, after mixing, pass through a sieve. It is advisable to use lime that has been slaked some time.

DISINFECTANT SOLUTIONS FOR HOUSE USE

Camphor gum	4	oz.
Alcohol	10	,, fl.
Water	10	,, fl.
Calcium hypochlorite	10	,,
Oil cloves	2	dr.
Eucalyptol	2	,,

Cut up the camphor and dissolve in the alcohol, then add the eucalyptol and oil cloves. This solution should be cold. Now dissolve in it the calcium hypochlorite.

A few drops of this fluid on a piece of cloth and hung in the room is enough.

TURKEY RED OIL

323 R.B.S., Bombay—Wants formulas of turkey red oil, naphthol soap, monople soap, etc.

Turkey red oil or alizarine oil is prepared by acting upon castor oil at about 40 C. with concentrated sulphuric acid. The treatment consists in running into the oil, slowly and with continued stirring, 20 per cent. of 66°Be sulphuric acid, the operation being performed in a lead-lined vessel kept cool by means of ice water. After leaving at rest for two or three hours, the mass is gradually thinned down with water and further diluted by stirring in a thin stream of luke-warm soda solution, about 3 times a crystallised soda to each measure of acid used being employed. The finished product settles out on being left over-night.

The product, which is either completely soluble in cold water or readily emulsifiable is employed in dyeing.

The reactions which take place are complicated, and the sulphonated oil contains a mixture of several substances.

NAPHTHOL SOAP

In making naphthol soap first prepare white soap stock with the following in the usual boiling process:—

Coconut oil	5 parts
Caustic soda (70°)	1 part
Water	2 parts

Dissolve the caustic soda in water and set aside. Then heat the coconut oil in pan over moderate fire and stir in the caustic soda lye. Add water from time to time to make up the evaporation. Continue heating until the saponification is complete. Then remove the pan from the oven and measure out the soap. Now to every 100 grams of soap stock thus prepared add 5 grams of N-Naphthol dissolved in 50 c.c. of alcohol.

MONOPLE SOAP

270 kilos of castor oil are sulphonated with 60 kilos of concentrated sulphuric acid, and the sulphuric acid, and the sulphonated oil is well washed with water and salt solution, and there is obtained 300 kilos of a sulphuric acid; 12.5—13.5 kilos of soda ash dissolved in water are added at ordinary temperatures until the product is neutral and dissolves in water to form a clear solution.

The sodium salt of the sulphonic acid is heated in a boiler until water vapours cease to be evolved. The temperature is raised to 130°C and on cooling a viscoid neutral oil is obtained, which dissolves in water to form an initially clear solution which lathers well. The product is soluble in petroleum spirit, benzene, ether, etc., and in mineral and fatty oils.

Reader's Business Problems

[Reader's business problems will be discussed in these pages. We invite the reader to write us his difficulties. As the department is in charge of an experienced businessman who is specially adept in dealing with such problems and to whom experiences of a large number of successful businessmen are available, his replies will lead the enquirer to a successful career. These replies will be published in the paper only and cannot be communicated by post.]

CAREERS FOR YOUNGMEN

952 P.K.D., Agra—Requests to suggest some careers for youngmen.

It is no easy matter to lay down a course for the modern youth of India. Much depends upon individual proclivities, physical development, intellectual training, even moral culture as to make it hazardous to lay down any general principles. Suffice it to point out that the only possible course is to direct the activities of the younger generation to diverse channels. The average youngman belonging to the middle class with a fair education can avail himself of a technical training which is by the by, as necessary for the economic advancement of a nation as cultural education is, for building it up and giving it an impetus to growth. With the spread of education amongst all classes and with increase in the standard of living of people, the articles of consumption show a most interesting variety. Many articles which were only in restricted demand previously have now come to occupy the place of common commodities, indispensable in our daily life. Scientific and industrial progress also adds to the list of our daily necessities. For example there is an enormous demand for all sorts of artwork of real merit. Good oil colour and water colour paintings sell at fancy prices. Clay or bronze modellings and marble statues are coming into popularity among the fashionable people. Attractive drawings for illustrations in advertisements as also for publication in books, journals, etc., are now in greater request than ever, and the master designs faithfully depicting the subject in a realistically artistic style and almost exorbitant prices in the market. The charm of photography and ceramic photography as well appeals to the heart and self-complacence of even the inhabitants of the remotest villages. Commercial art is also in most thriving condition. With the expansion of trade and commerce, businessmen are understanding the immense value of publicity. The development of the printing trades has rendered blocks for illustrating and stereotyping an indispensable adjunct of the publishing and advertising houses.

Various fanciful etchings and ornamental letters or designs on glass command great praise while pane glasses bearing artistic engravings of flowers and animals are objects of great beauty. Tumblers, vases and perfume containers carrying fine engravings also attract universal admiration. Stained glasses in various shades of colour, and gilded glasses, enamel or chinawares are also works of great workmanship. Etching, embossing, gilding and staining glass will thus provide a lucrative occupation to the young.

Decoration of porcelain in like manner will serve as a new occupation for the unemployed. Ceramists are constantly endeavouring to produce new colour effects on their wares and combine them

(Continued on page 426)

Queries and Replies

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of Re. 1 stamps for each question. Subscribers outside India are requested to send eight International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

385 S.S., Kanchanpur—Refer your query to the Agricultural Deparment. Tendu leaves are used for manufacturing bidi. Tendu leaves are available in the forest of Madhya Pradesh.

386 C.B.R.S., Surat—Following is a recipe of marking ink: Copper sulphate 20 oz.; aniline hydrochloride 30 oz.; dextrin 10 oz.; glycerin 6 oz.; water q.s. First mix dry ingredients and then mix in glycerin and just enough water to make a smooth paste of proper consistency for use with a fine brush.

387 P.C.B.S.R., Asansol—Following is a formula of taral alta: Rhodamine B. extra 1 oz.; brilliant crocience 2 oz.; rectified spirit 4 oz.; glycerin 1 oz.; glue 2 oz.; water 40 oz. Soak the glue in a portion of the water for a couple of hours; then warm and mix the remaining water. Raise the temperature to boiling paint and add the colours and glycerin. Then set aside to cool. When cold add the spirit and pack in bottles.

388 A.T.B.G., Lahore—Following is the process of galvanising iron articles: The article to be galvanised is first cleaned with dilute hydrochloric acid; next rinsed off, then placed in a solution of zinc chloride or sulphate and connected with the negative pole of a dynamo-machine. Zinc plates connected with the machine is set to work. The surface of zinc produced in this manner is provided with a metallic lustre by quickly moving the articles over a fire, or placing them in a chamber sufficiently hot to melt the zinc. If at the instant that this takes place a shock is given to the articles, the coating will assume the spangled appearance so much sought after.

389 S.C.D., Barrackpore—Sheet metal working machines may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Dies also may be had of the above firms.

390 P.D., Agra—Corks and bottles may be had of Radha Bazar Bottle Stores, 15, Radha Bazar Lane; P. S. Dutta & Bros., 8, Ezra Street and Nath & Bros., 67, Ezra Street; all of Calcutta.

391 B.K.P., Talpukur—We are not aware

(Continued from page 425)

with effects of reflection and lustre. Engraving and etching on metals like copper, brass, steel, nickel, aluminium are also convenient lines where the young men may find employment.

The demand for looking glasses and mirrors of reliable quality is now pretty keen. These meet with brisk sale provided only the quality confirms to the foreign standard. Making of mirrors will thus form another avenue for employment.

To talk of a quite different section, electric fans, motors, dynamos, etc., are to be overhauled, musical instruments attended to and fountain pens, kerosene stoves, etc., repaired. Various tools and instruments, parts for machines and fittings are also required in large quantities in big industrial establishments. Many articles required stove enamelling and instances of common-place modern requirements can be multiplied indefinitely in this way.

The above lines and others of this nature offer respectable avenues of employment to our young men in search of work, and independent careers of this type will not only go to take away the sting of the unemployment problem but will eventually build up the economic prosperity of the country, and will, what is of the most urgent immediate need, give a decent income to those who stand in the greatest need for it. Details of most of the careers mentioned will be found in our publication "Independent Careers for the Young."

of the address of the manufacturers of Zenith and Rip safety razor blades.

392 R.A.M., Bomay—Process of manufacturing aluminium from bauxite will appear in an early issue of Industry.

393 L.I.M.C., Monghyr—Sugar candy is prepared from a saturated solution of sugar, formed by adding sugar to boiling water till it dissolves no more. The solution is then run into troughs in which it is allowed to cool slowly, while a number of threads are hung in the liquid upon which the crystals form and continue to grow. The time required will depend upon the bulk of sugar treated. In working on a small scale, it will be necessary to remove the strings again while the liquid is cooling. Cakes of candy will also separate on the sides of the vessel in which the liquid cools.

394 L., Tripura—You perhaps want fruit juice extracting machine which may be had of Small Machineries Mnfg. Co., 22, R. G. Kar Road and Oirnental Machinery Supplying Agency Ltd., P12, Mission Row Extension; both of Calcutta. Process of manufacturing aluminium will appear in due course.

395 B.C.R., Bombay—The foam producers are made from saponin. The saponin is obtained by exhausting soap bark, soap root and soap nuts with water. The albuminoids in the solution were then precipitated by means of formaldehyde and the clear solution is evaporated to dryness in a vacuum. The resulting product is a very hygroscopic powder which is strongly sternutatory and which must be kept in well stoppered bottles as otherwise it congeulinates to form difficultly soluble lumps. The simplest foam extract consists of a solution of 1 part saponin in 9 parts hot water which is filtered if necessary, and rendered stable by addition of 1 per cent solidium benzoate.

398 R.K.D., Bombay—Following is a list of paper mills: Bengal Paper Mills Co. Ltd., 21, Netaji Subhas Road, Calcutta; Titaghur Paper Mills, Chartered Bank Bldgs., Calcutta; Rohtas Industries Ltd., 9, Dalhousie Square East, Calcutta; India Paper Pulp Co. Ltd., 8, Clive Row, Calcutta; Orient Paper Mills Ltd., 8, Royal Exchange Place, Calcutta; Shree Gopal Paper Mills Ltd., 6, Royal Exchange Place, Calcutta; Deccan Paper Mills Co. Ltd., Commonwealth Bldgs., Luxmi Road, Poona; Girgaum Paper Mills, Girgaum, Bombay; Lucknow Paper Mills, Lucknow; Mysore Paper Mills Ltd., Asiatic Bldgs., Kempegowda Road Bangalore-2; Punalur Paper Mills Ltd., Punalur Travancore Cochin; Star Paper Mills Ltd., 10 Clive Row, Calcutta and Standard Pulp & Paper Factory, Saharanpur Road, Nasik City.

399 R.R.S.T., Allahabad—Process of manufacturing fireworks will be found in September 1954 issue of Industry.

400 D.C., Jammu Tawi—Following is a list of belting manufacturers: Bengal Belting Works Ltd., 2, Dalhousie Square East, Calcutta; Birkmyre Bros. Ltd., 7, Stephen House, Dalhousie Square, Calcutta; Chowdhury Belting Works, 2, College Square, Calcutta and Lewis & Taylor Ltd., 6. Church Lane, Calcutta. Following is a list of fruit merchants: Dilwar Jan Md. Ariff, 12, Ramlochan Mullick Street; Dulichand Kishonlal, 146, Cotton Street; Faiz Mahmud Ali Ahmed, 13, Ram Lochan Mullick Street and Fakir Mohammed Uzir Mohammad 12, Ram Lochan Mullick Street; all of Calcutta.

401 R.B.S., Jammu—To clean gold lace lay it smooth on a woollen carpet or a piece of woollen cloth and brush it free from dust then take alabaster in very fine powder; sift it through a fine sieve; then put some of this powder over the lace and rub it over with a fine brush and in so doing it will take off the tarnish and restore it to its original brightness, if it be not too much warm on the threads

402 C.B.P.., Madras—Chemical blotting paper is made as follows: Mix 14 parts by weight of gypsum and 2 parts of potato flour with sufficient water to produce a plastic paste Press into a suitable mould. As soon as the mass has become hard and dry, it affords an admirable blotter.

403 F.I.L.O., Bombay—Following is a list of curio dealers: D. Bhicaji & Sons, 26 Churchgate Street, Fort, Bombay-1; G. Naraindas, 81, Wodehouse Road, Colaba, Bombay; H. Hassanand Company. New Silk Bazar, Bombay-2; Indian Art Museum, K. Lekhraj Bldg., Carnac Bridge, Bombay; Fonoomull Bros. (India), 26/28, Carnac Road, Bombay-2; B. Motiram, 52-53 & 29-30, New Market, Calcutta, 143, Lindsay Street, Calcutta; Hot Chand Motumals (The Curio Place), P-122, 123, 124, New Market, Calcutta; Kashmere Stores, Wellesly 2nd Lane, Calcutta; Lass & Sons, 3rd Bridge, Srinagar, Kashmir; Manik Chand, Chadni Chawk, Delhi and Mysore supplies, Post Box No. 6 Mysore.

404 M.B.R., Ajmer—Following is a formula of hair removing powder: Talc 7 ozs.; Starch

7 oz.; Barium sulphide 5 oz.; Powdered soap 3 oz. Mix well and scent with 1 dr. of benzaldehyde. To use mix a small quantity with water, apply over the hair to be removed. In about 3 minutes scrape off with a blunt knife and wash. If smarting, apply skin cream.

405 B.H.D., Anulia—Tablet making and other machines may be had of Small Machineries Mnfg. Co., 22, R. G. Kar Road and Oriental Machinery Supplying Agency Ltd., P13, Mission Row Extension; both of Calcutta.

406 O.I., Mathura—Indian sweets are exported to United Kingdom, U.S.A. and other western countries. Addresses of exporters of Indian sweets are not available. You may however negotiate with the Indian High Commissioner, India House, Aldwych, London, W.C.2. and Consul General of India in New York, 630, Fifth Avenue, New York, U.S.A.

407 M.L.C.. Kanpur—For chlorophyll enquire of Imperial Chemical Industries (India) Ltd., Chowringhee, Calcutta.

408 R. K. P., Banaras—For gypsum enquire of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

409 R.S.B.M., Quetta—Mosquito destroyer coils can be made as under: Take saw dust 10 parts; Powdered charcoal 6 parts; Nitre 2 parts; Gum benzoin 4 parts; Hard tolu balsam 2 parts; Insect powder 4 parts; Wheat flour 8 parts; Water q.s.; Green colour 2 parts. Reduce all the ingredients separately to fine powder and pass through sieve. Next dissolve the nitre in a small amount of water. Make a stiff mass of weat flour with this nitre solution using more water if required. Lastly mix the remaining ingredients. The stiff mass thus produced is put into a plodding machine where by means of a spiral screens, the mass is forced under great pressure through a number of holes of required diameter, so that the mass passes out of the machine in the form of a number of continuous rods or pencils. These rods are collected over a horizontal table and cut off in equal lengths. Then convert into coils by turning them with a wooden rod and expose to the sun to dry. Pack.

410 R.D.A.C., Ahmedabad—Tube filling machines may be had of Industrial Machinery Co., 20, Netaji Subhas Road, Calcutta.

411 B.K.R., Bombay—To bleach horse hair first thoroughly wash it in hot water. Then rinse well in clean hot water. Allow it to soak about 12 hours in a solution of hydrogen-peroxide made alkaline by ammonium solution. Lastly wash in clean water, and dry slowly.

412 B.S., Gaibandha—You may consult Manufacture of Soap published from this office, price Rs. 4/12/- including postage. Questions are replied by post on receipt of Re. 1/- stamps for each question.

413 I.B.P., Madras—Lampware and accessories may be had of Abbas & Co., 313, Abdul Rehman Street, Bombay; Bharat Light House, Mahakali Chawl, Pydhonic, Bombay. 3; H. T. Shah & Co., Ahmed Bldgs., 431, Golpitha, Bombay-4; K. C. Dey & Sons, 80, Lower Chitpur Road, Calcutta; Madan Mohan Dhur. 50, Old China Bazar Street, Calcutta; Satcowri Das & Co., 195, Old China Bazar Street, Calcutta; Wooma Charan Dey, 180, 181, Old China Bazar Street, Calcutta; Sun Company, Ayenkadai Street, Tanjore; and South India Corporation (Madras) Limited, 80, Sembudoss Street, Madras-1.

414 P.V.R., Calcutta—Unfermented lemon juice may be preserved by adding a small quantity of potassium metabisulphite, 4 oz. of the potassium compound dissolved in a half gallon of distilled water is sufficient to preserve 10 gallons of juice. Another method of preserving juice is as follows: Keep the filtered juice, before it has passed into fermentation without adding alcohol in a bottle hermetically sealed or heat the fresh juice in a closed vessel to the boiling point.

(Continued from page 429)

"The cow is an important feature of this type of farming, not only because it supplements the nutritive sources of the country but also because it feeds the land with its manure and provides a cheap source of power for traction and transport through its progeny. Besides, farming and livestock cannot be divorced from each other except at the risk of a great deterioration in the fertility of the soil."

The author wants this system of economy to be supplemented by cottage industries. Independent farmers making up this "core" economy can profitably carry on co-operative tasks. This economy is not opposed to machines and power provided these do not seek to replace human labour but make it more productive.

Review OF BOOKS

COMMUNISM AND PEASANTRY by Ram Swarup. Published by Prachi Prakashan, 12, Chowringhee Square, Calcutta. Pages, 184. Price, Rs. 9/-.

As claimed by the author, this book tries to understand Communism from an Asian standpoint. Obviously Russophobia is haunting his mind and those who fail to see eye to eye with him, may very well contend that fear clouds judgment in as much as it breeds a a pathological state of the mind. But those who are biassed against Communism will certainly fall back upon this well-written and learned treatise to argue as the author does, that Communism is a menace to civilization and that it is wooing Asia at the present moment when she is fighting for liberation from foreign imperialism, only because it wants finally to foist a new kind of imperialism on liberater Asia. It is redundant to point out that Communism and Soviet Russia are one in the author's mind. He also refuses to be deluded into believing that Chinese Communists are "Chinese, not Marxists".

Most books on Communism define and elucidate the role of the proletariat in Communist strategy and their political status and economic conditions. The present treatise is useful in as much as it departs from the usual vogue and studies the question of Communism vis-a-vis the peasants. It makes a fortnight attack on the ideology and explodes the illusion that Communism is the saviour of the peasant. The burden of its thesis is that the peasantry being the last capitalist class, Communism is pledged to their ultimate liquidation which is now being carried out by and through what passes for collectivization. The author quotes exhaustively from Lenin, Stalin and other Communist theoreticians to prop up this thesis of his, and no doubt this is an interesting intellectual game, this invocation of the aid of leading world Communists to decry the role of Communism vis-a-vis the peasantry. As the author puts it in his Preface, "This book studies Communist tactics and strategy in relation to the peasantry. It studies collectivist agriculture, its political drive, its economic promises, its future implications, its obligatory pattern , its promises and its achievements. In short, this book is a socio-economic study of Communism". --

The author looks upon the Indian Communists as the agents of Moscow. This is a very well-known type of allegation. Besides repeating it, the author contends that democratic leadership in India is completely ignorant about the nature of Communism. "Ignorance amongst the democratic leadership about Communism is the greatest weakness of democracy in its fight against Communism and is the most treasured asset of Russia trying to enslave the world with the help of the Red Army and World Communism". The following quotation from the book under review contains interesting reading material and it may be described as the very fuundation on which the treatise has been built:—

"Before 1914 there was a section among German Socialists who openly called themselves imperialist. Like the Russian Communists to-day, they theorized in a manner that made Marxism quite compatible with German expansion. They argued on strictly Marxism principles that their country being the most mature capitalist country was most near to Socialism; hence to resist German imperialism was to resist world Socialism. The argument of the new generation of Russian imperialists is the same, and they do not know of any other Communism which is not synonymous with their imperialism".

In chapters IX and X the author studies the problems of Indian agriculture and points out how it should be reorganised. Advocating decentralization, he says, "The real alternative to the capitalist pattern is not Communism, but a decentralized economy made more productive than it has been in the past. From handicraft level of production to machine-and-power using decentralized mode of production." In the course of those chapters the author makes the following points:—

"We want a revitalized agriculture carried on by independent peasants on land fed by organic manure with traction-power supplied by the bullock.

(Continued on page 428)

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A Monthly Magazine for Manufacturers and Businessmen.

Editor: K. N. Banerjee.

Published in the first week of the month by

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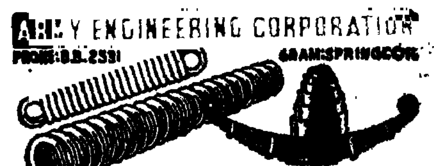
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Industry

...E FOR MANUFACTURERS & BUSINESSMEN

VOL. XLV. | CALCUTTA, NOVEMBER, 1954 | No. 536

CHEMICAL FERTILISERS

The relative merits of organic manures vs. chemical fertilisers have been discussed almost to tedium in the press. But even though opinion remains divided on whether or not organic manures should be discarded or at least used less extersively and replaced by artificial fertilisers, wherever and whenever possible there seems a marked tendency these days on the part of our countrymen to make a widespread use of chemical fertilisers. The tendency is rising steadily and so the Government is amply justified in accepting in principle, a scheme for expanding production of nitrogenous fertilisers. Four more fertiliser factories are likely to be set up as a result of the enquiry now being made by a high power committee which has already been constituted.

The sites of these factories have not yet been decided upon except that of the one to be established in the area of the Bhakra-Nangal project. The States which have already made known their claims to having at least factory established in their respective areas, include the Punjab, Rajasthan, U.P. Orissa, Madras and Bombay. Not all agree that the Bhakra-Nangal region is an ideal site for a fertiliser factory. Agra is claimed to be a suitable place on the ground that it is midway between the sources of gypsum and coal. Rourkela (Orissa) is considered a suitable site because the blast furnaces of the proposed steel plant may be utilized for the manufacture of fertilisers. Bombay's claims rests on the plea that the products of the refineries will provide suitable raw materials for the fertiliser industry. Madras wants South Arcot to be chosen as a site for the establishment of one of the proposed plants because the area is rich in its resources of lignite. Rajasthan's claim is based on the plea that it possesses rich deposits of gypsum.

The high-power committee will have to examine the above claims on their own merits and while making the final selection, it must choose only sites when the maximum possible advantage can be derived. India being poor country, attention must be bestowed on the question how the cost of production of fertilizers can be kept low thereby helping consumers have them at a low price. Also, care must be taken to see that so huge a sum as Rs. 80 crores, the total estimated cost of the four projects concerned, is not frittered away in the least.

The most compelling reason why the Government feels the need to key up the production of chemical fertilisers, is provided by the fact that our cultivators are now making an increased use of them. It is estimated that by 1957 India's total consumption may rise to 173,000 tons per annum as against her estimated output of 109,000 tons. The estimated gap between production and consumption will be 64,000 tons and it may widen further as a result of the propaganda for the use of chemical fertilisers now being carried on by those in charge of Community Projects and National Extension Schemes.

The proposal to set up a fertiliser plant in the Bhakra-Nangal project area

has been opposed by many. It is claimed that in this area hydrogen will be available as a by-product of the heavy-water production proposed at this site. But the place is not considered strategically sound and so, many question the wisdom of locating heavy-water production here needed for nuclear development. Bhakra-Nangal area is considered unsafe because it is very near Indo-Pakistan border. South India is claimed—and that rightly enough—to be a more safe area both for the production of heavy-water and the establishment of fertiliser factory. The British rulers of India too took into account the strategic position of a place while setting up plants producing goods of a strategic value. Bhakra-Nangal is not suitable area for the production of ammonium sulphate as gypsum, the main raw material will have to be brought from distant Rajasthan thereby involving huge transport costs. If the production of ammonium nitrate is decided upon, the fact can be hardly ignored that the soil of the Bhakra-Nangal region is already rich in its nitrogen content. The area needs phosphates and superphosphates and it will be a tragedy for the reasons stated above, if money, energy and skill are frittered away in attempts to manufacture ammonium sulphate and ammonium nitrate in the Bhakra-Nangal project area.

The soils of certain regions in southern, western and eastern parts of India are not rich in their nitrogen content. These places should be considered suitable for the manufacture and consumption of ammonium nitrates. Rajasthan and Kutch may be considered as ideal sites for the location of plants to produce fertilisers which are made principally out of gypsum. The material is present in the areas concerned in satisfactory quantities and its quality too is thought to be good. Areas where gypsum is scarce should be considered unsuitable for the manufacture of ammonium sulpahtes, which needs gypsum as its principal raw material. Some think that in such areas efforts may be made to manufacture ammonium nitrate as it does not require any gypsum and/or urea.

Bombay's Commerce makes a strong plea for the manufacture of ammonium nitrate. It says as follows in the matter:—

"It would appear that the objection of the Union Minister of Agriculture to the production of ammonium nitrate is based on the fact that farmers are accustomed to use only ammonium sulphate. This does not seem to be a valid objection. It cannot be beyond the competence of the Ministry of Agriculture in the Centre and the Agricultural Departments in the States to educate farmers in the use of ammonium nitrate which is twice as much concentrated as ammonium sulphate and which is also cheaper to manufacture." The paper further argues that in times of emergency these plants can be used to manufacture amatol, a high explosive, as it is being done in the West.

Commerce makes another important point. It contends that efforts need to be made in our country for the manufacture of phosphatic fertilisers of which it has a genuine dearth. Alleging that very little attention is being paid to the manufacture of potassic and phosphatic types of fertilisers, the journal writes as follows:—

"This is rather unfortunate, because we are told that, if nitrogenous fertilisers alone are used a time will come when the said will be exhausted and become useless for crops. The soil needs, according to experienced agronomists, potassic and phosphatic fertilisers also for the abundant growth of roots and the healthy development of plants. It is only mixed fertilisers, containing nitrogenous potassic and phosphatic elements, that help maintain and improve the fertility of the soil. The main obstacle to the production of phosphatic fertilisers is the absence of sulphur deposits in India and the consequent necessity to import sulphur for manufacturing sulphuric acid. But, thanks to the latest research, this is not an insuperable difficulty. Scientists aver that, if magnesium sulphate, of which there is a surplus production in India, is used with rock phosphate, the phosphate in the mineral colud be converted citric soluble phosphate which is easily assimilable by the plants in the soil.

FALLING STOCKS

U.S. stocks are now falling in the East and even in the West there are many who look askance at the U.S. practice of giving aids to foreign nations, apparently with a view to helping them on to their feet but actually for the purpose of hooking them into a political cum military alliance with them. The words Mr. Chester Bowles spoke at the ninth annual convention of the U.S. Tea Association recently held in Bretton Woods, are an eloquent testimony to his realization of this naked truth. He called upon the USA to offer unconditional financial assistance to the nations of the East and there is no doubt that he meant well for the nations in the East are in no mood any longer to reconcile themselves to political and other strings being attached to the financial and other material and technical aids they accept from Washington.

Mr. Bowles also served the significant information that Russia is making efforts to produce additional goods worth about 30,000 million dollars each year by 1957 a sizeable amount of which will be invested in overseas economic development particularly in Asia. The USA can meet this challenge, if she so desires, by acting on the advice of Mr. Bowles, quoted in the following paragraphs.

Mr. Bowles told his audience that the USA should speak to Asia in the following terms: "For generations, the West took from you more than it gave you. The wealth that flowed from India, Indonesia and other Asian nations to the capital of Europe helped to build universities, railroads and shipping and prosperity. Some of that wealth even helped indirectly in building the USA. This flow of wealth from East to West came at a time when moral standards in the world were different from those of to-day. Recognizing this change and recognizing also the great needs of the underdeveloped nations of the world, we now propose to offer you our financial assistance and support. We ask nothing in return except your own all-out efforts on behalf of your people to create a broader prosperity and expanding opportunities." But the crux of the matter is why the USA should care to harbour so much solicitude about the welfare of other nations. She may contend that she wants to promote the cause of world peace by building a prosperous world all around her. That is quite well and good as a profession and there being almost an unbridgeable gap between her practice and her profession, very few will be agreeable to judge her aims as altogether altruistic.

Mr. Bowles, as reported by Reuter, also set forth a seven-point programme for American to develop a partnership with the peoples of Asia, Africa and South America. He advocated freer trade and lowering of trade barriers; some system which would cushion any shock in the raw material producing nations when commodity prices dropped sharply in America; reorganisation and expansion of the present programme of technical assistance, as much of it as possible to be handled through the UN, to counter the propaganda that Point Four was a cover for U.S. intrigue and subversion; direct economic grants; continuing support and eventual expansion of the World Bank; establishment of an international finance corporation affiliated to the World Bank to grant loans to private corporations for expansion; and investment of more private U.S. capital in the underdeveloped countries.

FISH CULTURE

In the course of a recent talk on "salinity of West Bengal rivers and fish culture" before the Engineers' Circle Dr. S. L. Hora, Director, Zoological Survey of India, said that human interference was a major factor in the deterioration of a number of rivers of West Bengal. Pointing out that the changes in the fish fauna had served as indicators of changing salinity in the rivers of West Bengal, Dr. Hora said that the Adiganga which was once the haunt of an entirely brackish water fauna, was now represented by a series of ponds and pools and the fish fauna of the region was entirely of the fresh water type. Dr. Hora added that in the Hooghly, probably because of dredging operations, more salt-water was able to penetrate up the river as was evidenced by the various species of surface and bottom living marine fish that were to be found in the upper reaches. Dr. Hora said that if such changes were accelerated by more and more dredging without flushing the river from above, it was probable that the Palta Water Works would one day become a brackish water farm and the city's water supply would have to be arranged from other sources.

Referring to the system of fish culture in *Bheris* Dr. Hora said that the rise in salinity of water had resulted in the ruin of many productive fisheries. Crabs and certain boring fish make tunnels in the embankments to escape from waters of high salinity and this eventually leads to the collapse of the embankments. *Bheris* must have a fresh water supply and salinity of water should be properly controlled to enable fish to be reared and fattened over a number of years. Dr. Hora added that in many *bheris* by the river Bidyadhari adequate supply of brackish water had become a great problem. These *bheris* now hardly receive water supply for more than three or four days round about the full moon and new moon periods, because of the silting up of the river. The productivity of these fisheries has been affected adversely.

Dr. Hora concluded with a reference to the fish culture scheme in the Salt Lake area he had submitted to the Government of Bengal in his capacity as Director of Fisheries. He made a fresh plea for the reconsideration of the scheme and expressed the hope that its implementation would help the reclamation of the area and production of food fish.

TEA INDUSTRY

The Plantation Inquiry Commission appointed by the Government of India in April last, have already begun their Assam tour. The Commission will make a comprehensive inquiry into the economic conditions and problems of the tea industry in Assam and other places in India.

As reported in a Calcutta Daily, the terms of reference of the Commission are: to ascertain separately the amount of capital, Indian and non-Indian, invested respectively in tea-plantations; to examine the methods of production and cost of production; to examine the methods of financing the industry; and to examine the methods of marketing tea at home and abroad. On conclusion of the inquiry the Comminsion will make recommendations to the Government on the measures necessary to secure for the producer and the consumer, a fair price, to enable the provision of necessary finance for the industry, to ensure suitable marketing arrangements and to develop and expand the tea, coffee and rubber plantation industries. The Commission will submit its report to the Government by the end of April, 1955.

SUGARCANE PRICES

A conference of the representatives of cane growers, the sugar industry, the trade and different State governments was

discussed at the conference was the price of sugarcane for the 1955-56 crushing season. Dr. Punjabrao Deshmukh, the Union Minister for agriculture, described the sugar problem as very intriguing. He pointed out how the sugar surplus had changed into a deficit and the need for exports, given place to a demand for imports. The representatives of cane growers demanded that the minimum price of sugarcane can be raised from Rs. 1|7|- per maund to Rs. 1|12|- in 1955-56. Millowners said that the price of cane should be lowered to enable the industry to lower its cost of production with a view to bringing down the price of sugar. The trade preferred to adopt a middle course and suggested a moderate increase in prices to help expansion of sugarcane acreage and prooduction. The U.P. Government wanted that the price of cane should not be lower than Rs. 1|8|- per maund as the growers needed sufficient inducement to produce more sugarcane.

Reporting on the Conference, the Statesman writes as follows:—

"Controls on the distribution and price of sugar for 1954-55 were discussed in the same strain, growers urging that controls should continue and manufacturers demanding that the distribution of sugar should be set free as an effective check on prices rising.

"The Government at present follows the policy that releases of sugar from mills should be regulated so that a reserve stock of about 300,000 tons is always available with the industry.

"The Government has frequently made use of this stock to sell it at fair prices whenever they showed a tendency to rise.

"Linking of cane prices with sale prices of sugar, the subject of an agitation in U.P., has been accepted in principle. The Ministry's new formula, which gives ... able to growers in important ... laid before the meeting. The ... found general acceptance.

BIAS FOR INDUSTRY

Presiding at the quarterly meeting ... the Indian Chamber of Commerce recently held in Calcutta, Mr. G. ... Binani said that there should be a strong bias in favour of heavy industries in the next stage of industrial development under the Second Five Year Plan as ... was in this field that the country had ... make up the greatest leeway. Many ... agree with him that so long as heavy industries are not built up, the industrial structure of the country will stand on ... weak foundation.

Mr. Binani admits the importance ... the role of small scale industries in ... national economy but is also at the same time wide awake to the handicaps confronting them. The handicaps are ... regard to supply of raw materials, finance and credit, and marketing and distribution. Decrying the present vogue ... safeguarding small-scale industries ... sentimental grounds without due regard being paid to economy in production ... taking effective measures to help them raise their working efficiency, Mr. Binani pleaded as follows:—

"In the planned development of the country, small industries should be ... integrated with the expansion of large ones that they impart added strength ... the entire industrial structure."

"Small-scale industries have great scope if they function as ancillary ... feeder industries to larger ones. But, ... on the other hand, they are allowed ... grow in an unco-ordinated manner at the expense of large industries, it will introduce an element of weakness in our econmy. We should not forget that we aspire to become a modern and highly industrialized country, we have to take

advantage of the economies of large-scale production and give the rightful place to large industries in our schemes of future development."

On behalf of trade and industry Mr. Binani makes it clear that they will stand by and co-operate with the Government in their task of working out the country's industrial regeneration. He wants the next five year plan to set more ambitious targets for industries.

Referring to the Bank Award Mr. Binani advises that nothing should be done that might curtail the limited banking facilities available in the country.

He was outspoken in his condemnation of the transport bottleneck. The coal industry happens to be one of the worst affected. As urged by him, the reconstituted Railway Board should give attention to the problem and take effective measures to set things right. Mr. Binani further suggests that efforts should be made to find out if the regrouping of railways has anything to do with the present deterioration in railway transport.

AID FOR HANDICRAFTS

The Government of India has sanctioned further grants and loans for the development of handicrafts, khadi and handloom products. P.T.I. gives the following details of these aids:—

Orissa gets a loan of Rs. 5 lakhs to be reloaned to cottage and small-scale industries.

A loan of Rs. 3 lakhs has been given to Saurashtra for execution of a scheme regarding "industrial loans" during the current financial year.

The All-India Khadi and Village Industries Board has been given a grant of Rs. 2,65,000 and a loan of Rs. 1,89,700. A grant of Rs. 42,125 has also been given to the Board for the development of the cottage match industry.

Madhya Pradesh has been given a grant of Rs. 1,83,330 for the development of the handloom industry.

For development of handicrafts, the Government has sanctioned grants and loans to the following States: Bombay a grant of Rs. 38,700 for the development of pottery, and grant of Rs. 32,903 for a dyeing and printing centre at Ahmedabad; Madhya Pradesh a grant of Rs. 11,300 for the training centre for wooden toy manufacture; Bihar a grant of Rs. 7,235 for a handicrafts designs centre and a loan of Rs. 5,000 and a grant of Rs. 2,500 for marketing organization for handicrafts.

AGRICULTURAL TIPS

THE FOX-TAIL ORCHID

The fox-tail orchid (Rhynchostylis Retusa B.C.) is one of the most beautiful of our indigenous orchids and is favourite of both amateur and professional gardeners owing to its handsome inflorescence and the ease with which it can be grown.

The plant is of a hardy nature. It has a thick short stem of about 5 to 6 inches long covered with old brown leaf sheaths. The leaves are thick and fleshy and are about 10 to 16 inches long and about 1 to 1½ inches broad. They are arranged obliquely in a spreading and recurved manner. The flower raceme is ordinarily from 10 to 16 inches long. It is densely clothed with spotted flowers of a delicate waxy white purple with a tip strongly tinged with violet pink. The pedicels are short and stout. The tail like, almost cylindrical form of the receme gives the orchid—its common name.

CULTURE

The plant is easily propagated by the division of stem suckers, carefully severed from the parent plant with a couple of roots attached to each. Its long, thick and veriform branching roots enable the plant to thrive best on live tree trunks which have fairly thick and splitting corky bark, for example jack and mango. Palms are less suitable. After removal of dead roots and dried parts of the lower stem, the plant should be carefully placed on the trunk of a live tree. The root system immediately around the plant should be covered with a little moss and coconut fibre and the whole should be secured firmly with coir string. In tying the plant care should be taken to see that it is kept in its natural growing position and that the roots are not cut or injured by the string.

Low-hanging and injured roots may be cut back to about a foot from the plant. Only copper wire may be used to secure the plant to the tree trunk as other kinds of wire affect the growth of the roots. The plant prefers a warm, moist atmosphere, and thrives best on an eastern aspect. After being tied to a tree the plant needs regular syringing with water for at least four to six weeks to encourage it to give out new roots.

In the green house or conservatory the plant may be grown in perforated pots or baskets preferably those made of wood. Plants that have lost their lower leaves should have their stems cut off at a point immediately below some young active roots in order to bring the position of the leaves to the surface of the pot. Only a few healthy young roots should be left. All others should be cut back to a point which allows insertion into the pot without overcrowding. Plants with short or few roots may be supported by a stick placed in the bottom of the pot. After the roots have been placed in position, half the receptacle should be filled with pieces of decayed wood or bark, chopped coconut husk, charcoal and bits of bricks, and the other half with a compost of roots of Asplenium nidus (birds nest) finely chopped and mixed with crushed crocks or charcoal to keep the compost porous. During the first week, the compost should be kept moist; afterwards morning and afternoon syringing will be sufficient until the plant starts growing, when copious supplies may be given. Plants grown in this manner produce blooms annually about June-July which last for over four weeks. When the plant is well established the only attention or care that is necessary is a

little watering during times of drought, if the plants are in an open shed or house.

AGRICULTURAL OPERATIONS FOR DECEMBER

For The Plains

Vegetables.—Make sowings of radish, mustard, cress, lettuce, peas and French beans for succession. Put out fresh plants for knol-khol, cabbage, cauliflower, and celery. The most advanced crops of celery will be now in a condition for earthing up to blanch previous to use. Water well celery, squash, raddish, and asparagus seedlings. Withhold water from old asparagus plants, that may die down and go to rest.

Fruits.—Gather roselle. Well water cape gooseberries. In the United Provinces the plants should be covered in at night during the cold months. Place seedling bilimbis in a warm, sheltered place during the cold months. Towards the close of the month cover again the roots of the fruit trees, that had been exposed, with fresh enriched soil.

Ornamental Plants.—Put down cuttings of aloysia citriodora, heliotrope, geranium pinks, carnations, habrothamus, verbenas. Allow to dry down arum picture, gesnera tubiflora, sprekelia, the varieties of caladium and such other potted bulbous plants. In the United Provinces cover over at night to protect from pest young heliotropes, tropoeolum, canary creeper, and seedling menhdee plants. Keep under the shelter of a warm varandah Ixora Javanica, hoyas, and vanilla plants that are in pots. Make successive sowings of such quick-growing things as browallia, linaria, cuphea, mignonette, French marigold and concolvulus major. Asters, cinerarias, and pansies will require re-potting in a richer soil.

For The Hills

Vegetables.—There is scarcely anything to be done this month, and the remarks for last months will apply equally for this one. If it is thought worth while, some of the later seedlings from October might be kept in frames with a hot-bed; but as a rule, English vegetables are in full season in the plains during this and the next two months, and residents on the hills obtain their supplies from this source during the winter.

Fruits.—There is nothing to be done during this month out of doors. Most of the fruit trees will have shed their leaves, and will soon be putting on their winter mantle of snow.

Flowers.—The remarks for the last month made in our previous issue will apply equally for this. Water should be entirely withheld from all plants except those that flower during the winter, and these should be sparingly supplied—just enough to keep them alive.

Bleaching of Furs

The hair of the fur in its normal state has a film of liquid material which tends to prevent the uniform penetration and absorption of the catalyst and bleaching solutions. In order to eliminate this film, and also to bring the hair into a state of suitable for efficient absorption of these solutions, the fur is given what is known as "killing". In general the killing solution consists of a mild alkali, such as sodium carbonate, ammonia, borax, di-sodium phosphate and the like, freqently in conjunction with soaps, or with other surface-active agents, and sometimes with solvents. By immersion of the furs in the killing solutions the hair is degreased, and at the same time a degree of swelling takes place, proportional to the extent of absorption of water by the fibre. The more efficient the "killing" action, the more regular and uniform will be the absorption of the catalyst solution, and consequently ensuring bleaching action. Because of the wide range of furs with their different hair characteristics, it is important to adjust the killing treatment in accordance with the kind of fur being treated. Some types of killing solutions are the following:—

TYPICAL KILLING SOLUTIONS

A few recipes of killing baths are given below: mentioning the type of fur of animals to be treated:—

WOLF

Sal-soda	4-7	grams
Water	1000	c.c.

Mix. The fur should be dipped for 2 hours at a temperature of 75° to 80°F.

RED FOX

Sal-soda	4	grams
Water	1000	c.c.

Mix. Dip the furs for 2 hours at a temperature of 75°-80°F.

SQUIRREL

Sal-soda	6	grams
Soap	3	
Water	1000	c.c.

Mix. Dip the furs for one hour at a temperature of 80°F.

SUSLIKI

Ammonia sp. gr. 0,90	5	c.c.
Water	1000	c.c.

Dip for 1 hour at 80°F.

VICUNA

Potassium carbonate	5	grams
Water	1000	c.c.

Dip for 2 hours at 80°F.

MOLE

Ammonia sp. gr. 0.90	5	c.c.
Soda ash	5	grams
Water	1000	c.c.

Dip for 2 hours at 80°F.

RABBIT

Di-sodium phosphate or borax	10	grams
Penetrant	1	gram
Water	1000	c.c.

Dip for 2 hours at 80°F.

BROWN MOUFFLON

Soda ash	5	grams
Formaldehyde	1	c.c.
Water	1000	c.c.

Dip 2 hours at 80°F.

BLACK DOG

Bicarbonate of soda	15	grams
Water	1000	c.c.

Dip 2 hours at 80°F.

RACCOON

Soda carbonate	5	grams
Penetrant	1	gram
Water	1000	c.c.

Dip 2 hours at 80°F.

SKUNK

Soda ash	10	grams
Water	1000	c.c.

Dip 2 hours at 80°F.

The above killing treatments may also be applied by means of brush instead of immersion.

APPLICATION OF CATALYST

After "killing" the furs may be treated with a catalyst previous to bleaching. This will assist the furs to be bleached uniformly. The most commonly employed catalyst is ferrous sulphate, although other ferrous compounds are also used, but to a much smaller degree. Solutions of ferrous sulphate tend to oxidise readily to the ferric state, and it is generally necessary to have a stabilizing compound present to prevent or retard such oxidation. Considerable variations are possible as to the composition of the catalyst solution with reference to both concentration and added ingredients. The following are some examples of catalyst solutions in current practice.

I

Ferrous sulphate	16	grams
Ammonium chloride	16	,,
Water	1000	c.c.

II

Ferrous sulphate	40	grams
Ammonium chloride	16	,,
Cream of tartar	2.5	,,
Water	1000	c.c.

III

Ferrous sulphate	25	grams
Ammonium chloride	10	,,
Tartar emetic	2.5	,,
Glacial acetic acid	1.5	c.c.
Water to make	1000	c.c.

IV

Ferrous acetate 20°Be	50	c.c.
Water to make	1000	c.c.

As a general rule, the catalyst is applied to the furs by immersion. It may also be applied by the brush. The various types of fur tend to absorb the catalyst to differing degrees, and it is necessary to work out the particular conditions for each type of fur. In doing so, consideration must be given to a number of factors which have an important bearing on the fixation of the catalyst by the hair. The effect of these factors may be summarized as follows:—

1. The amount of ferrous compound absorbed by the hair varies directly with the intensity of the "killing". This in turn may be co-related with the pH of the solutions used. However, if the hair after "killing" is adjusted to a constant pH somewhat below 7, the variation in the amount of catalyst absorption due to the "killing" is greatly reduced.

2. Washing of the hair after the treatment of the ferrous solution has only a very slight effect on the removal of iron fixed by the hair, indicating a rather stable iron-protein compound.

3. The use of small amounts of acids to stabilize the ferrous salt solution tends to reduce the amount of iron absorbed. The pH of the ferrous solution at which absorption is greatest is in the vicinity of 5. Adjustment of the pH of the hair after "killing", to lower values in the acid range, shows a corresponding decrease in the amount of iron fixed.

4. Increasing the temperature of the ferrous salt solution, as well as increasing the duration of treatment, results in increased absorption of the ferrous compounds.

5. Increasing the concentration of the ferrous salt solution results in increased absorption of the catalyst by the hair, although the ratio is not a simple direct one.

6. Different sections of the individual hair fibre absorb the catalyst solution to varying extents, the greatest amount of absorption towards the hair tip. Where it is desirable to have a more uniform absorption throughout the length of the hair fibre, it is customary to give the tips of the hair a preliminary brush "killing" before the regular "killing".

BLEACHING

The furs, after having been treated with the catalyst solutions are made in

e bleached. For this, a simple solution of ydrogen peroxide may be used, or any ne of a large number of peroxygen solu- ions containing various additions for the urpose of stabilizing, activating, or other- vise facilitating the bleaching action. The ollowing are the few typical illustrations f bleach baths of practical value:—

1. Hydrogen peroxide	4	volumes
Sodium carbonate	2	grams
Ammonium chloride	2	,,
Distilled water to produce	1000	c.c.
2. Hydrogen peroxide	6	volumes
Ammonia sp. gr. 0.90	7.5	c.c.
Water to make	1000	c.c.
3. Hydrogen peroxide	50	c.c.
Ammonium persulphate	7.5	grams
Ammonia	7.5	c.c.
Water to produce	1000	c.c.
4. Hydrogen peroxide	30	c.c.
Potassium persulphate	7.5	grams
Borax	7.5	,,
Ammonia	7.5	c.c.
Water to produce	1000	c.c.

These illustrations indicate the wire ange of pH suitable for the bleach bath, ı conjunction with the ferrous catalyst. n actual practice, this range is limited to bout pH 6 to pH 11. In bleaching at ɔwer pH, for example 4-5, the use of an cid bleach bath gives satisfactory results ɔr certain types of bleaching, but it must e remembered that there is a tendency ɔr the catalyst to be stripped from the bre under such conditions. The general rocedure is to immerse the skins in the leach bath at a temperature of 70° to 0°F., stirring frequently to assure uniform ction. The duration of bleaching is sually 3-5 hours. While the dip process the method chiefly employed, the other rocesses such as those previously ıdicated may be used as well.

The course of the bleach reaction ɔows some interesting phenomena, which ıay be described as follows:—

1. During the first half hour or so of eatment very little bleaching effect can be noticed. However, there is a definite change of colour of the catalyst on the fibre, indicating the formation of a ferric compound.

2. During this initial stage there is a sharp size in the temperature of the bleach bath, after which the temperature remains approximately constant for several hours, and then tends to decline.

3. The initial period is also accom- panied by a considerable consumption of the hydrogen peroxide present, after which the rate of decomposition is much slower and much more regular.

4. Varying the composition of the bleach bath causes a corresponding variation in the initial action of the bleach bath, but all types of bleach bath tend to run parallel courses after this initial activity.

5. The average bleaching operation is complete within 4 to 5 hours, and it is a striking fact, that at the end of this period, a considerable amount of hydrogen peroxide still remains in the bleach solu- tions; in some cases more than half of that present at the outset of the bleaching. Attempts to start with bleach solutions containing only half or slightly more, of the hydrogen peroxide normally used (other things being equal) do not give satisfactory bleaching results. It has been found practicable, however, to utilise the residual hydrogen peroxide by building up the used bleach solution to the original concentration with the addition of the re- quisite quantity of the other constituents. For certain purposes, it is also possible to conduct the bleaching over a greater period of time, using a lesser concentration of hydrogen peroxide, which is well stabilized, and the pH of which does not exceed 8—8.5.

After the furs have been bleached to the desired degree of decolourization, they are hydrogen extracted, washed thoroughly, and may then be dried and

finished as usual. The bleached furs are in general pale beige colour due to the presence of a basic ferric compound in the hair, which acts as a mineral dye or colouring matter on the bleached fur. This mineral dye may be of various shades of yellow tan, depending on the composition of the catalyst solution, as well as on the constituents of the bleach bath other than the hydrogen peroxide. Where it is desired to modify this colour, the skins may be dyed directly, or after a preliminary mordanting treatment.

In order to achieve paler, or more delicate tints, or to obtain a bleached fur substantially free of the catalyst, the furs after removing from the bleach bath may be given one of several types of treatment. By immersion of the bleached skins in a solution of acid, the basic ferric compound may be dissolved out of the fibre almost completely. Acid compounds which may be used, are sulphuric hydrochloric, the various organic acids such as acetic, oxalic, tartaric and citric, and some acid salts—such as sodium bisulphate. An acid which is of special interest is hydrofluoric, generally used in the form of an acid salt, such as ammonium bi-fluoride. These fluorein compounds have the interesting property of forming double salts with the basic ferric compound, such double salts being white.

Another type of treatment involves the use of reducing agents, which convert the catalyst from the ferric state into the ferrous compound, which can act as a mordant for a dyeing operation. Any of the reducing compounds, such as sulphurous acid, sulphites, or hydrosulphites may be employed to accomplish this result. On some cases, the combination of the acid stripping method with the reducing treatment gives improved results

Automobile Spray Painting

There are few finished products, with the possible exception of aircraft, that are subjected so consistently and so continuously to outdoor exposure, wear and tear as the automobile, yet its smooth fine finish is expected to remain bright in good condition for an extraordinary long period of time.

The foundation of a good finish is the surface to which it is applied. Thus, the first consideration is the careful preparation of the metal surface to receive the priming and finishing coats.

CLEANING, BONDERIZING AND DRYING

After fabrication of the bodies, all surfaces inside and outside, are blown off with compressed air to remove all metal and solder filings. The bodies are then washed with mineral spirits or kerosene to remove grease and drawing compounds. This preliminary washing is done just before the bodies are suspended from an overhead chain conveyor which moves through the cleaning and bondering operations.

BONDERIZING

Bonderizing is a chemical treatment that converts metal surfaces which have been freed of grease, oil, alkali, acid, salts and hand marks to a corrosion inhibiting phosphate coating. It provides a surface perfectly suitable for the proper adhesion of the finish, thus minimizing its possible loosening by vibration and shock. Should the paint film on a finished body be scratched or otherwise marred so that the bare metal is exposed, the phosphate coating will retard the spread of rust which forms on the uncoated metal and confine it to the damaged area.

After the bonderizing process, the bodies are transferred to an overhead conveyor which takes them through the spray painting and drying operations. The first operation on the paint line is a special pre-priming of certain hard-to-reach places, as for instance, the narrow channel where the top and the sides are welded together. A spray gun equipped with special nozzle is used to force the primer into these and other hard-to-reach places. The precaution provides insurance against rust starting in these places.

The bodies are now given a final blow off before entering the first spray booth for an over-all priming coat. This booth is equipped with automatic reciprocating spray guns which operate in a pit in the floor. These guns spray a coat of an alkyd primer over all underbody surfaces.

An alkyd primer is next hand sprayed over the bodies. In 1½ minutes, this operation is followed with a second coat of the same material. These bodies now enter a baking oven where the primer is baked for one hour at 250° to 275°F.

COLD WATER SPRAYING AND WET SANDING

As the bodies leave the exit of the oven, fixed nozzles spray cold water over the entire body to cool the metal and prepare the surface for wet sanding. Portable sanding machines fitted with waterproof abrasive paper are now used to sand flat and nearly flat surfaces. Surfaces that have too much curve or bend to be hand sanded.

On completion of the wet sanding, the entire body surface is washed with cold water. All seams and joints in the interior of the body are given a heavy coat of asphalt-base rubberized material which is applied hot and under pressure with a flow gun.

Bodies are then dried on oven for 30 minutes at 250°F. Upon leaving this dry-

ing oven a thorough inspection is made. Then follows knife glazing, light hand sanding of glazed areas, and a complete blowing-off with compressed air.

ENAMEL SPRAYING

The outside of the body is now given a tack rag wiping to pick up any lint or dirt that may still be left. Next follows a spray coat of synthetic enamel sprayed over the outside. After a flash drying of 1½ minutes, a second top coat of the same material is applied, and the bodies immediately enter an oven which is connected to the spray booth. The entrance to this oven serves as a pre-mater. The bodies travel for 10 minutes at 220°F to 275°F.

The booth in which the enamel top coats are sprayed is maintained under pressure. Filtered air is forced into it at the rate of 107, 840, cu ft. per minute. In this pressurized spray booth, automatic regulators hold the temperature at 80°F while the relative humidity is 75 per cent.

In addition to the use of controlled temperature and relative humidity, viscosity tests are made on all finishing materials in the central paint circulating storage room, which is also kept at a temperature of 80°F. The paint circulation storage room and the spray booth are both maintained at this temperature so that the material and the metal surfaces will be warm enough to assure an easy smooth flow of the enamel. The purpose of the high relative humidity is to retard the evaporation of the solvents while the enamel is being sprayed, thus assuring a smooth leveling out of the material.

On having the oven, the bodies pass under fluorescent lamps where a thorough careful inspection is made. Minor repairs are made here and then the finished bodies are delivered to the trim lines.

REJECTIONS

Rejected bodies are wet sanded down to the prime coat. After this they are resprayed and baked as in the regular production line and delivered the trim line.

FINISHING HOODS

Hoods are washed, first with mineral spirits and then with alkali cleaner. To neutralize the alkali cleaner an alcohol ammonium solution is used as a quick rinse, after which the hoods pass through an oven for an 8-minute drying period at 220°F. On leaving the oven, they are removed from the line to receive their hinges. Next follows wiping with a tack rag.

Back on the line again the hoods are conveyed through a water wash spray booth where an alkyd-base primer is sprayed on. The primer is baked for one hour at 250°F to 275°F. Due to the curved contour of the hoods, the wet sanding is done by hand, using waterproof abrasive paper. A thorough washing with water and a blow-off compressed air follows, and the hoods are then dried for 38 minutes at 250°F.

After inspection, the hoods are given their finishing spray coats—two coats of synthetic enamel on the top, and one coat on the underside. This finish is baked for 1 hour at 250°F to 275°F. Then comes under inspection and repairs taken care of, after which the hoods are placed on the hood delivery line.

FINISHING FENDERS

Fenders are received with their surfaces already bonderized. Black finished fenders are often completely dip-coated and baked. The first operation consists of a light sanding with emery cloth. Next comes inspection for dings, Necessary repairs are made and followed by grinding and buffing. The fenders are now passed on the conveyor through a trichlorethylene vapour degreaser. After a tack rag wipe they are dip-coated with a black oil-base primer. On emerging from the dipping tank the fenders drain and enter an oven where the prime coat is baked for one hour at 300°F. Inspection and a light sanding with waterproof paper follows. After a naphtha washing, wiping, blowing-off and

tack ragging, the fenders are dip-coated with black synthetic enamel: then they are pre-heated and baked.

Fenders that are to spray finished are carried on the conveyor through a booth where a double coat of synthetic primer is applied all over. This is baked for 1 hour at 275°F. Wet sanding follows using waterproof sand paper. The fenders are next passed through a drying oven and then into the top coat spray booth where a double coat of synthetic enamel is syprayed on. This is baked for 1 hour at 275°F. Fenders are now delivered to the assembly lines.

AUTOMATIC & HAND SPRAYING WHEELS

Wheels are usually received from storage in a bonderized condition. They are tack rogged and placed on holders on a revolving turnable. This turnable revolves clockwise. In the booth, four spray guns are mounted in fixed position on a reciprocating arm which travels in an arc parallel to the perimeter of the turntable. As the turntable carries the wheels through the booth the spray guns follow through for the width of the arc and then cut-off as the carrier arm returns them to the starting position where they automatically cut-on to spray the next wheel. This automatic wheel spraying machine has a capacity of 600 wheels an hour, coating one side. Wheels are baked for 30 minutes at 275°F. After cooling for about 15 minutes, the wheels are aready for striping.

In the hand spray method, the wheels are wiped with the tack rag and placed on an overhead conveyor which passes through a water-wash spray booth where two top coats of synthetic enamel are applied. This double coating is baked in an infra-red tunnel for 15 minutes at 350°F. After the wheels become cool the stripes are laid on with a mechanical striper which applies the stripes as the wheel revolves on a fixed shaft. One operator and two handlers stripe 600 wheels an hour. Inspection follows and the wheels go to the tyer mounting department.

THE TACK RAG

We have mentioned this many times we now explain it briefly so that one may understand the article.

In years gone by where coach and wagon finishing was done with varnish, a "tack rag" was a home made commodity prepared by dipping a cloth in a mixture of varnish and turpentine and then shaking it until the surplus varnish had dried and the cloth became slightly sticky or "tacky" from which its name is derived. Of course, the tack rags have changed along with their improvement in the finishing methods and materials.

The use of a tack rag will show a tremendous difference in the appearance of an automobile finish. It insures a surface that is free from dust, lint and fine sanding particles, before applying the final coats. No other method so completely guarantees a thoroughly clean surface. Without the use of the tack rag, it is impossible to completely remove fine sanding dust with the air gun or dust brush as these circulate the dust in the air from where it slowly settles back down on the surface during application of the final lacquer or synthetic enamel coat. Attempts to rub them out when the finish has dried are of little avail as they become so imbedded in the coating that rubbing pulls them out and leaves a pitted surface.

AUTOMOBILE REFINISHING PROCEDURE

When the car comes in the workshop for a refinishing job, check its contents to note what tools and other articles are in it. When the car goes out again on completion of the work having a list of the contents will save time and sometimes dispute. Take out all removable parts

such as knobs, top seats, door handles, etc. Slip some heavy paper under the hood to protect the engine. This allows the car be sprayed without removing the hood, thus saving the handling of a big heavy hood over the finished job with accompanying finger prints and possible marring. Be sure that all nickel and chromium plate, as well as all glass are properly marked off and protect with paper and marking tape before beginning the spraying operation.

STRIPPING OFF THE OLD FINISH

For a complete refinishing job the old finish must be entirely removed. Since types of finishing materials have become more diversified, so have the problems of removing them become more complex. In the days when lacquer was the popular automobile finish, refinishing or touching-up was comparatively simple. A touched-up spot could be rubbed and polished to blend with the surrounding finish. Dust presented little trouble because the lacquer dried before much dust could settle. Rubbing easily removes overspray and minor blemishes.

The present day use of synthetic materials, both baked and air-dry, make the refinishing job a more or less complicated affair. Patching is more of a problem. Re-coating over another material involves some risk because the solvents used in some finishes will penetrate the preceding coat causing it to lift and wrinkle. Then again the patching and sanding of a synthetic material in preparation for the finishing coats may be more than if the finish was stripped and started new. Thus it becomes a problem whether to strip or not to strip.

If the decision is to remove the finish, it may be accomplished by either burning-off, solvent remover, alkali or caustic stripper, or baked enamel stripper.

BURNING OFF

One of the oldest methods of removing paint, etc., is to burn it off with a blow torch. The procedure is to apply the torch flame to the finish until it softens and then to scrape it off. It is a tedious job and the fire hazard is apparent. There is also the risk if the flame is kept on one spot too long. It can only be used on finishes which burn easily.

SOLVENT REMOVERS

These are commercial preparations and are applied directly to the work. They are blends of various active solvents in which are suspended or dissolved waxes or other substances.

When the finish has been removed, the surface must be carefully washed with either naphtha, mineral spirits or lacquer thinner to eliminate all remaining traces of wax.

ALKALI OR CAUSTIC STRIPPER

The alkali stripper is carefully balanced commercial preparation which does a much better job than the old fashioned hot solution of caustic lye. Such a product contains ingredients to assist wetting, to float away dissolved pigments and facilitate rinsing. Directions for using them are usually printed on the package. If for any reason these are not available, a satisfactory substitute may be made using 7 oz. of caustic soda and 4 oz. of tri-sodium phosphate per gallon of water.

When the finish has loosened, the residue may be scrubbed or flushed off with a jet of water. The surface should then be thoroughly dried and recoated immediately to avoid rusting of the surface.

BAKED ENAMEL STRIPPER

These are phenolic or emulsion type strippers and are the most dangerous to use. Goggles and rubber gloves must be worn and should any be splashed on the skin or eyes, the place should be immediately flooded with cold water followed by alcohol on the skin and boric acid solution for the eyes.

They are most practical [illegible]

shop where a large tank is available for dipping the parts to be stripped. When the articles are immersed in the solution, stripping is accomplished through swelling of the enamel, thereby destroying its adhesion to the metal. When the finish is well loosened, a thorough hosing with cold water and proper drying prepares the part for refinishing.

RE-FINISHING WITH LACQUER

Now that the surface is properly cleaned and dried, spray in two fairly thin, smooth coats of prepared lacquer primer-surfacer. After proper drying time, wet sand all over using waterproof sand paper. Wash with cold water and allow to dry. Should any depression or holes be observed in the surface, these should be built up with suitable filler made up commercially for the purpose. Use it at full body for holes and low spots. Thereafter reduce with proper reducer, to an easier glazing consistency and go over these parts with this thinner material. Work the primer surfacer out smoothly; don't plaster it on, but spread it evenly so that it will require a minimum of sanding. Parts. when properly filled, should be allowed to dry out and then sanded with waterproof sand-paper using plenty of water. Then finish off with fine waterproof sand-paper and water to blend the place into the surrounding area. If this is carefully done, cleaning up as the work proceeds, it will not require anything but a dusting off and tack rag wipe all over to prepare the surface for the lacquer top coat.

After tack ragging, the first top coat of lacquer is sprayed on. After a flash drying of from 15 to 20 minutes the second top coat is sprayed on. This coat should be allowed to dry for 6 to 18 hours and then rubbed down with compound to remove orange peel and compound to remove orange peel over-spray. Rubbing compounds are in paste form and may be thinned to working consistency with naphtha. They are applied to the surface and then rubbed with a hand rubbing pad made of felt. Mechanical rubbers are also available. But generally hand rubber is used in all the moderate size workshop. The hand rubber should be dipped into the thinned compound and then applied to the surface. Begin rubbing with light pressure first, gradually increasing it to the degree of pressure which you can maintain comfortably for a long time. Keep the surface wet. When using a mechanical rubber apply compound to the surface with a rag. Cleaning up the surface is done with naphtha or water.

RE-FINISHING WITH SYNTHETIC ENAMEL

For a synthetic enamel job, when the surface has been carefully cleaned and dried after stripping, spray on a light coat of air-dry alkyd primer. On the completion of this operation, apply another coat in the same manner, and allow this to dry overnight. Low spots, dents and holes should now be glazed and sanded, as previously described for lacquer finish, and the whole surface then wet sanded with waterproof sandpaper, followed with a cold water wash off, tack rag wipe and thorough drying.

A first top coat of synthetic enamel is now sprayed on. Apply a light, but wet coat, being careful not to flood the surface. On completion of this operation, start all over again and apply a fuller and wetter, again being careful to avoid runs. The job should then be allowed to dry overnight before driving the car out.

If the finish is not too badly worn and needs only brightening up, proceed as follows: Wash all over with mineral spirits or special commercial wax remover, make sure that no trace of wax or grease is left on the surface. Sand out all rusted and worn places, and spot-spray these with either lacquer or synthetic enamel, according to the type of finish on

the car, taking pains to carefully feather-out the edges. The old colour should be matches as closely as possible. A final rubbing with compound and then polishing these touched-up areas will blend them into the old finish. The car should then be finally polished all over.

In all touch-up and refinishing jobs, the undersides of fenders should be thoroughly washed and cleaned of all dirt, and then given a good heavy coat in synthetic enamel, asphaltum varnish or some other suitable heavy bodied weather and abrasion resisting material.

Nickel Plating

Nickel plating is applied primarly for its appearance and for its corrosion protection of steel and of brass- and zinc-base objects. On articles subjected to outdoor exposure, chromium is usually deposited over the nickel, since chromium stands weathering much better than nickel.

Electrodeposited nickel is used for electroforming of sheet, tubes and screen and for build-up of worn steel parts. The composition of the bath used depends on the application, and the characteristics can be changed by shifting the bath limits just as in the copper cyanide baths. However, the formula cannot be changed continously from one bath composition to another without running into trouble with shift in the plating range, bath control, anode polarisation or bath balance.

BATH FORMULATION

A popular nickel bath is a modification of the original Watts bath that has the following composition:—

	g./1.	oz./gal.
$NiSO_4 . 7H_2O$	240	32
$NiCl_2$ $6H_2O$	45	6
H_3BO_3	30	4
pH	1.5-3.0 or 4.5-5.6	
Temperature	11°F.	
Current Density	40 amp./sq. ft.	

The metal content of this bath is relatively high. The high metal content and high total salt result in relatively good bath conductivity which, in turn, contributes to good metal distribution and wider plating range than a low total-salt concentration.

The presence of chloride ions in the bath promotes anode corrosion and makes it possible to obtain bath balance. The chloride also increases the cathode efficiency at low current density and thus improves metal distribution.

Boric acid serves as a buffer in the bath and thus simplifies pH control. The boric acid is only slightly ionized and furnishes few hydrogen ions, but will furnish them as rapidly as they are removed. Thus it acts as a reservoir for ionizable hydrogen. This function is important because pH control is critical in a nickel bath. It will also be found that a better-quality deposit will be obtained in the presence of boric acid.

BATH PREPARATION

Bath preparation is carried out in the rubber-lined tanks commonly used for nickel plating. The nickel salts are readily soluble in water, but the boric acid is sometimes troublesome to get into solution. The use of heat and

agitation will greatly promote the dissolution of the chemicals. After dissolving the chemicals, the pH is adjusted and the bath is ready for initial plating. It is not likely that the bath will immediately plate satisfactory. Very often, the deposit will be pitted or off colour. If the deposit is satisfactory, as determined by a test panel, then it is often found that bond to the basis metal cannot be obtained. This condition is remedied by working the bath. Electrolysis will remove objectionable impurities and put the bath in operating condition. Electrolysis prior to plating is most effective at low current densities (3 to 7 amperes per square foot). During initial electrolysis, a heavy deposit will be produced and the condition of the deposit will indicate the need for further bath treatment. If the deposit is pitted, a smalll amount of hydrogen peroxide will usually remedy the trouble. If the deposit is rough or off colour, the bath should be treated with active carbon and filtered. It is good practice to work a fresh bath, treat it with active carbon and filter it all at the same time. Small-scale tests can be made to predetermine the amount of treatment required and plating tests can be made on a large bath during treatment to follow the course of the treatment.

OPERATION AND CONTROL

The operation conditions of the nickel bath should be such as to obtain bath balance as closely as possible, with frequent adjustments to hold the bath within the range. If the bath is operated in approximate balance and adjustments are made to keep it in the range, then additions of chemicals will be small. This is important because excessive bath treatment will be avoided. The nickel salts contain impurities that make it necessary to treat a nickel bath before use. If large amounts of nickel salts are added during control, the same treatment will be required. However, small additions of nickel salts will not contain enough impurities to make purification treatment necessary. Small amounts of impurities will be eliminated during normal plating operations, without causing harm.

Usually, nickel bath is operated according to some accepted formula. The limits on all ingredients will be set as follows: total nickel, sulphate, chloride, ammonia, boric and pH. All of these can be controlled by analysis and none of them should change rapidly in the balanced bath, with the exception of the pH. If the bath is operating correctly, the pH should increase and it should frequently be brought to the lower limit by the addition of acid. If initial data are taken on the bath, a graph can be prepared for additions of acid necessary to adjust to the lower pH limit for any pH reading.

It will also be convenient to take gravity readings on the bath since a gravity reading is a rapid check on the over-all solids content. A second operating graph can then be prepared.

Bath balance is indicated if changes in composition are small. Changes in gravity, nickel content or rapid changes in pH indicate that the balance is not proper. The balance is obtained by adjustment of the anode area. The cathode efficiency will be fixed by the bath limits, therefore, it will be necessary to adjust the anode area so that the anode efficiency is equal to or slightly greater than the cathode efficiency. If the positioning of the anodes limits the anode area, and thus the anode-current density, then it may be necessary to try changing the cathode-current density. However, if the cathode-current density is dropped and the plating rate is not sufficient, then it is better to add more chemicals than to try to approach bath

balance too closely. The working principle is to obtain a satisfactory deposit at a satisfactory plating rate and as close to bath balance as possible. Perfect balance, of course, cannot be obtained because drag-out will upset any scheme for perfection.

Anodes that will corrode uniformly, at the proper rate and without formation of sludge, are not available. But, of course, anodes are available that are satisfactory if they are accepted as not being perfect. Usually the corrosion rate is satisfactory and is accompanied by the formation of an insoluble deposit on the surface of the anodes. This deposit may become suspended in the bath and migrate to the cathode to cause a rough deposit and necessitate filtering. The trouble is overcome by bagging the anodes, but it must be realized that bags restrict replenishment of solution to the anode. If sludge builds up in the bags, the anodes will be further restricted so that they must be removed, cleaned and replaced in clean bags occasionally.

Since nickel plates only slightly more readily than hydrogen (as indicated by a cathode efficiency of less than 100 per cent), the nickel bath is subject to contamination by all the metals that plate from an acid solution, including iron and zinc. Usually the contaminating metals are removed by low-current density electrolysis. Iron, which is a contaminant, is removed by oxidation of the bath and increase of the pH with nickel carbonate until the iron is precipitated as ferric hydroxide. The ferric hydroxide is then filtered off.

Organic contaminants are common. These come from the chemicals, tank linings, stop-off lacquers and rack materials. They can cause brittle and cracked deposits and must be removed. Electrolysis may remove organic contaminants, but active carbon is usually more effective. On large installations, it is profitable to continuously filter, treat and electrolyze a nickel bath. This is best done in a tank separate from the plating tank.

PREPARATION OF THE BASIS METAL

Steel is prepared for nickel plating by cleaning and pickling proir to plating. Pickling may be done by immersion or by the use of anodic current. In either case sufficient acid should be present to remove rust or scale if it is present on the steel. The use of inhibitors in the pickling bath is not recommended. Inhibitors are used in pickling steel for economic reasons. The economy consists in saving acid by reducing the attack on the steel while scale is being removed. If steel is removed, of course, acid is used. Heavy scale is hardly ever encountered on work to be plated. In addition it will be found that a certain amount of metal must be removed to render the steel active and to secure bond. It is best to remove this quantity of steel by pickling in uninhibited acid or by the faster anodic pickling treatment. In addition inhibitors may cause trouble in the plating operation if they are not completely removed by the rinse.

If nickel is to be plated on zinc or aluminium, it is best to preplate these basis metals with copper before the nickel coating is applied. These metals are too active to be placed directly in an acid nickel bath. In the case of aluminium, it has been found necessary to either anodize or to immersion-plate zinc from a zincate solution prior to striking with cyanide copper.

TYPES OF NICKEL BATHS

The applications of nickel plating are varied and, therefore, many bath formulations are used.

For bright nickel plating, the high concentration Watts bath is generally used with several proprietary additions

agents. The bath is operated under conditions similar to the conditions of the regular Watts bath, except that hydrogen peroxide cannot be added and the bath cannot be treated with active carbon without destroying the addition agent. Therefore, if purification is required, the bath will have to be taken out of operation, treated and adjusted with fresh addition agent.

A nickel bath may be used to plate directly on zinc-base alloys if the concentration of nickel ions is reduced. The effective concentration may be suppressed by the reduction of the ionization of nickel salt, by means of the addition of various salts. The following solution is an example of a bath recommended for plating on zinc base

	g./1	oz./gal.
$NiSO_4.7H_2O$	70	9
NH_4Cl	15	2
$Na_2SO_4.10H_2O$	160	22
H_3BO_3	15	2
pH (electrometric)	5.5	

With such a bath, it is not necessary to use a copper strike in order to plate on zinc-base alloys. In cases where thin deposits and such baths are desired that can be operated without close control, a double nickel salt bath of the following composition may be used:

	g./1	oz./gal.
$Ni(NH_4)_2(SO_4)$ 6H_2O	105	14
NH_4Cl	15	2
H_3BO_3	15	2
pH (electrometric)	5.3	

The double nickel salt bath may be used for volume production of parts where a thin deposit is required. If the parts are small, the plating can be carried out more economically in barrels. The appearance of the deposit may be improved by adding brighteners to the bath. If brighteners are added to a nickel bath of a formula other than that recommended to be used with the brighteners, some experimentation must be done. A minimum amount of brightener should be added and additions should be increased in small steps.

Plating-range tests should be run to establish the optimum bright-plating range. The bath can then be controlled by the plating-range test from the original plating-range data.

Hard nickel baths are used for electroforming and salvage of worn parts. Wesley and Roehl suggest the following bath for depositing thick nickel deposits with a hardness of 380 to 480 Vickers:

	g./1.	oz./gal.
$NiSO_4.7H_2O$	180	24
NH_4Cl	25	3.3
H_3BO_3	30	4
Current density	50 amp./sq.ft.	

A tensile strength of 140,000 to 160,000 pounds per square inch was obtained on specimens deposited from this bath with an elongation of 4 to 9 per cent for a 2-inch gage length. Thus the deposit was hard without being excessively brittle. Brittle deposits are occasionally obtained in nickel plating because of internal stress. This internal stress is often so great that the deposit will be torn from the basis metal during deposition. Brittleness and hardness are not necessarily related. The physical properties of the deposit depend on the structure. Banded structures are easily identified metallographically and are the ones that often give trouble.

Earlier baths developed by Wesley contained a high concentration of nickel chloride and no nickel sulphate. These baths would plate nickel of fair hardness and with good anode corrosion because of the high chloride content. The deposits, however, were often of a dark, matte appearance and after looking at ordinary nickel deposits, the appearance of this type of deposit is not pleasing. This point is worth mention-

ing because if one is interested in plating for engineering purposes, it is well not to be too much influenced by the appearance of the deposit. Microscopic examination will reveal a sound, nodular surface that traps the light and results in a dark-gray appearance. Metallographic examination of a cross-section is a better key than the appearance of a plated surface.

Manicure Preparations

Manicure has been brought almost to a fine art very largely through the business acumen of the Americans. At one time the idea of varnishing the nails would have seemed ludicrous; to-day it is practised by most women and many men. These preparations include liquid nail paste polish, nail cream, nail bleach, nail polish remover, powder polish, cuticle remover, cuticle softener, and nail tint. The most popular items are the nail polish and remover, nail powder and nail bleach or nail white. The powder appeals especially to men while all the other preparations are used by women. The liquid nail enamel is sold in a clear state and also in various shades of red.

COMPOSITIONS OF A GOLD NAIL ENAMEL

The average nail enamel consists of four elements: A glossing material such as gum, rosin, shellac, wax or some form of nitrocellulose; a suitable solvent such as acetone; a plasticiser such as camphor, and a spreader such as amyl acetate. It is not always necessary to add the plasticiser for the reason that in many cases, it is already included in the gloss material-nitrocellulose film being a case in point. However, the amount of plasticiser thus contained is usually not sufficient or of the requisite character and it becomes necessary to add a spreader consisting of a high, or more commonly, a medium boiling solvent such as amyl acetate. The function of the plasticiser is to keep the enamel flexible after it has dried on the nails. The addition of a medium or high boiling solvent is to provide easy spreading qualities by preventing too rapid evaporation of the solvent.

To develop nail enamels which provide requirements, it is necessary to balance glossing materials, spreaders or plasticisers and solvents in such a way that all requirements will be met.

REQUIREMENTS OF A NAIL ENAMEL

The requirements of a good nail enamel are: the enamel must flow on evenly, it must not be sticky, it must adhere to the nail well and it must be elastic and does not crack or pull after drying on the nails. In addition to all these factors the colouring produced by its application over the nails is uniform.

SUITABLE INGREDIENTS

Among the materials used in this preparation as glossing media are: cleaned, used motion picture film and other forms of nitrocellulose or cellulose acetate such as pyroxylin or celluloid, and also rosin, shellac and carnauba wax.

The low boiling solvents include ethyl acetate, acetone, ethyl alcohol, isopropyl alcohol, ether, methyl acetate, etc.

The medium boilers include: diethyl carbonate, amyl acetate, butyl acetate, butyl alcohol, amyl alcohol, etc.

The plasticisers include ethyl benzoate, ethyl lactate, dibutyl phthalate, camphor, castor oil, benzyl alcohol butyl stearate, diethyl phthalate, etc.

It is obvious, that a low boiling solvent for nail polish will also serve as nail polish remover. As moisture causes blushing all solvents should be anhydrous to obtain highly glossy articles.

Let us now recommend a few good recipes; of these articles giving briefly their procedure.

NAIL POLISH

I

Cleaned motion picture film	8	parts.
Amyl acetate	22	,,
Acetone	70	,,
Scarlet dye, spirit soluble	5	,, or more.

First of all clean the waste motion picture film by boiling it in sodium carbonate solution for about half an hour. Then take it out and scrape it with a blunt knife to remove the silver from its surface. Then wash and dry. Cut it into small pieces.

Now mix the amyl acetate and acetone. Put the film into the mixture and allow it to stand until dissolved. Stir in the colour and then strain and put in phials.

II

Cleaned motion picture film	8	parts.
Amyl acetate	22	,,
Ethylacetate	50	,,
Scarlet dye as desired.		

Mix the amyl acetate and ethyl acetate. Add the film cut in small pieces and allow to stand until dissolved. Add the colour and then strain and bottle.

III

Pyroxylin	6	parts.
Ether	36	,,
Isopropyl alcohol	36	,,
Amyl acetate	22	,,
Dye as desired.		

Mix the ether and isopropyl alcohol, add the pyroxylin in it. Allow to stand until it is dissolved. Next add the amyl acetate. Dye sufficient to suit.

IV

Celluloid	30	grams.
Methoxy acetophenone	1	gram.
Ethyl alcohol, absolute	100	grams.
Amyl acetate	300	,,
Acetone	600	,,
Rhodamine B	0.1	,,

Mix all together and keep aside to dissolve. Then put in phial.

V

Waste motion picture film	200 gr.
Acetone	5 fl. oz.
Amyl acetate	2 fl. oz.
Eosine	50 gr.

First of all clean the film by soaking it in soda solution for a day, then scrape it with a blunt knife. Dry it in the sun. Then cut it into small pieces and weigh out. Put it in the mixture of acetone and amyl acetate in a well stoppered bottle. Then add the colour. Keep aside to dissolve. Then strain and bottle.

NAIL POLISH REMOVER

As already stated, these are mixtures of low boiling solvents. A few recipes follow:—

I

Acetone	60	parts.
Ethyl acetate	40	,,

Mix.

II

Acetone	35	parts.
Isopropyl	65	,,

Mix.

NAIL ENAMEL

Celluloid	87½ gr.
Amyl acetate	2 fl. oz.
Acetone	6 fl. oz.
Phloxine	15 gr.

Dissolve the celluloid in the mixture amyl acetate and acetone and then mix the phloxine to colour.

NAIL POLISH POWDER

Tin oxide	7 parts.
Talc	2 ,,
Rice starch	1 ,,

Perfume as desired.

Mix. The required amount of perfume is dissolved in alcohol and sprayed on the mixed dry ingredients.

NAIL POLISH PASTE

Tin oxide	5 parts.
Carnauba wax	3 ,,
White beeswax	1 part.
Petrolatum, short fibre, soft	10 parts.
Titanium dioxide	1 part.

Mix the titanium dioxide with the tin oxide. Melt the carnauba wax, beeswax, and petrolatum. Slowly sift in the dry materials and mix with stirring.

CUTICLE REMOVER

The function of cuticle remover is to dissolve the cuticles. In practice, however, most women prefer to remove the cuticle by cutting them than to risk irritation through the use of a strongly alkaline solution. A typical preparation is given below:—

Glycerine	20 parts.
Trisodium phosphate	6 ,,
Distilled water	70 ,,
Rose water	2 ,,

Disslove the alkali in the water, add the glycerine and the perfume.

NAIL BLEACH

Nail bleaches are intended to remove tobacco stains and discolorations from the fingers and nails. It is prepared either in paste or liquid form. It is also employed to impart to the end of the nail a white tip. Hydrogen peroxide, Citric acid Oxalic acid, Titanium dioxide, etc., are the usual active agents. A couple of formulas are given below:—

I

Titanium dioxide	2 oz.
Talc	2 ,,
Purified zinc peroxide	½ ,,
Petrolatum	2½ ,,
Mineral oil	2½ ,,

Mix the petrolatum and mineral oil. Now add the dry materials with stirring. This makes a pasty preparation.

II

Citric acid	4 oz.
Oxalic acid	1 dr,
Rose water	32 fl. oz.

Mix in a phial.

NAIL CREAM

Petrolatum	5½ oz.
Spermaceti	1½ ,,
White beeswax	1 ,,
Lanolin	1 ,,
Perfume as desired	½ fl. oz
Distilled water	12 fl. oz.

Melt the first four ingredients and heat the last. Add the water to the melted fats and mix thoroughly. Finally add the perfume.

CUTICLE SOFTENER

Cholesterin	25 parts.
Petrolatum	17 ,,
Beeswax	10 ,,
Sulphonated castor oil	24 ,,
Sodium lauryl sulphonate	4 ,,
Trisodium phosphate	2 ,,
Distilled water	17 ,,
Rose water	2 ,,

Melt the first four ingredients together. Dissolve the phosphate in water, add the sodium lauryl sulphonate and heat to 80°C. Mix until cool and add the rose water and bottle.

Indian Gums

Gums of varying natures collected in different parts of India constitute an important portion of world's production and specially a large part of the American consumption. The gums from the genus Anogeissus of the family Combretacae include the species Latifolia which is widely distributed in India and in Ceylon. This is the tree which yields ghatti as it is more specially known. Another important group of gum is collected from the genus Sterculia and specifically from Sterculia urens. The dried exudation from these trees enters commerce as karaya. It is to be noted in most cases the Indian gums are the exudations of large-sized trees, while the arabic and tragacanth group of gums are collected from small thorny trees which in some cases approach bush-like character.

Because of their importance, ghatti and karaya are specifically discussed inasmuch as these are two of the few which have reached the stage of continuous commercial collection, grading, and organized trading on a recognized quality basis.

There are a number of other gums, usually produced in small quantities and sold under the designation of Indian gums. These are discussed from the botanical viewpoint and include among others the terminalia gums while the gums from various species of acacia which grow in India are discussed in connection with gum acacia and arabic.

GUM GHATTI

Ghatti gum, also known as Indian gum and Ghati gum, is a gummy exudation from the stem of Anogeissus latifolia Wall. The genus Anogeissus (Fam. Combretacae) includes four or five different species of tropical trees. Of these A. Latifolia is widely distributed in India and Ceylon. The tree is large and its leaves are rich in tannins and are used for tanning in Bombay. The gum is collected in April.

Ghatti gum should not be confused with either Bassora or gum Sterculia each of which is sometimes referred to as "Indian gum". Bassora gum is a collective term to indicate a group of highly coloured gums somewhat resembling tragacanth. A gum of this class originally came into commerce from the neighbourhood of Bassora on the Gulf of Persia. The two principal commercial Bassora gums are pale-coloured members of the class known as Indian gum and gum kuteera. Indian gum is obtained from Cochlospermum gossypium DC. (Fam. Bikaceae), a tree indigenous to southern Asia. One gram of gum added to 50 cc. of water forms an uneven mucilage which contains a few reddish-brown to yellowish-brown fragments. Upon stirring, the mucilage separates in the form of coarse uneven strings. Gum kuteera is obtained from Sterculia urens Roxb. (Fam Sterculiaceae) a tree indigenous to southern Asia, abundant in sub-Himalayan tracts from the Ganges eastward and in Iran. It is inodorous, yellowish-brown tears or irregular masses and swells in water. Gum Shiraz is sometimes also confused with ghatti gum. There are two broad groups of gum Shiraz, (1) a gum from Iran, (the gum Shiraz) and (2) a product from India which is a mixture of the gum Shiraz and a number of fruit gums (peach, apricot, etc.), which are similar to ghatti. The Indian gum Shiraz is sometimes used in textile printing.

Ghatti gum appears on the market

in several variations, with a wide range of properties and appearance, e.g., verniform or rounder tears of varying size, colourless or pale yellow. The principal grades are "ordinary" or "insoluble" and "superior" or soluble" Actually none are totally soluble, but by means of an autoclave the gum may be made soluble. Poorer grades are not exported but used in India. Ghatti gum may be distinguished from gum arabic by its dull surface, uniform vitreous fracture and by the frequent presence of vermiform tears. It has a slight odour and an insipid taste; it is not entirely soluble in water. It forms a viscous, adhesive mucilage, more viscous and less adhesive than gum arabic. It is insoluble in (90 per cent) alcohol. Its aqueous suspension is gelatinized by addition of alcohol (90 per cent or by a solution of lead subacetate, but unaffected by solutions of ferric chloride or lead acetate. It is not coloured blue by iodine solution, indicating absence of starch and dextrin.

The gum ghatti was found to be 90 per cent soluble in water. The soluble portion which contained 0.72 per cent nitrogen, consists of a calcium salt of a polysaccharide acid, ghattic acid. The molecular weight of the soluble portion is about 12,000 as determined by osmotic pressure measurement. Free ghattic acid isolated by alcoholic precipitation has an equivalent weight of 1735. It contains 50 per cent pentisan, and at least 12 per cent of galactose or galacturonic acid. On hydrolysis of gum ghatti with sulphuric acid the specific rotation changed from +42° to +58°. From the hydrolysis mixture, P-arabinose was isolated together with the barium salt of an aldobionic acid, pH 3.3, equivalent weight 353. Gum ghatti dialyzed from its solution in approximately normal sulphuric acid solution until sulphate free, gave a pH of 2.9 Electrometric titration with sodium hydroxide and hydrochloric acid gave an equivalent weight of 1340, corrected to an estimated pH 1.7 for the lower limit of the titration curve for the gum.

Carhart and Shaw in a study of coagulation of Prussian blue sols and Prussian blue protected by gum ghatti sols, report pH as an important factor in the coagulation. The influence of pH is due to its effect on the gum ghatti. In strongly acid solutions at pH 8.2 below its buffering range (2.7 to 5.5) the gum is a neutral colloid. As the pH is raised, the gum converted to the sodium salt which is a negative colloid. Cataphoresis experiments showed the unproetected Prussian blue was an electropositive colloid. Prussian blue in gum ghatti solution at pH 0.8 was electropositive the cataphoresis experiment showing an interesting phenomenon. During the course of the first few hours the Prussian blue-gum ghatti micelle was electropositive and moved toward the negative poles. Assuming the Prussian blue particles to be positive and the surrounding layer of gum to be negative, it is possible that at lower pH there is only a slight different in charge between the two. The micelle, being slightly positive, migrates towards the negative electrode where it comes in contact with a relatively more alkaline medium (from the K0H), which favours the acquisition of more negative by the gum. This neutralizes the micelle which remains satisfactory, along with many other micelles, forming the rings. At pH 5.4 the gum ghatti is electronegative as are also the Prussian blue-gum ghatti micelles and the latter are stable towards agents which precipitate the Prussian blue containing no protective colloid. The isoelectric point, i.e. the point as which the micelles do not migrate to positive or negative poles, of the Prussian blue

gum was found to be between pH 2.2 and 1.4 probably at 1.7 The most satisfactory range for coagulation by KCl of the gum-protected blue sol was found to be between pH 2.2 and 3.3 Above pH 4.2, the colloid was completely stable to saturated solution of KCl.

The uses of gum ghatti are similar to those of gum arabic. In India and certain other parts of the British Empire it may be employed in making official preparations for which gum acacia is directed to be used, one part of ghatti replacing two parts of acacia in a number of pharmaceutical preparations.

KARAYA

Gum karaya has become an important raw material in the textile, cosmetic, food and other industries. It resembles gum tragacanth in that it swells in cold water to form an opaque gel. Karaya gum has been used in the United States since the latter part of the 19th century, but the large scale use in the United States dates from World War I, when the price or tragacanth was high. Karaya is frequently sold as tragacanth and undoubtedly, even before World War I, some of the gum sold as tragacanth was really karaya. Karaya gum imports in the United States are far in excess of those of tragacanth, usually more than double. Karaya is less expensive than tragacanth, and is superior for certain purposes.

Gum karaya is the dried exudation from trees of the Sterculia urens, a native tree of India, which is found chiefly in Gujerat, the central provinces and to some extent in the Central Indian Agency.

It is known as gum karaya, gum kadaya, Indian tragacanth, India gum (not to be confused with Indian gum which is another name for gum ghatti) and Sterculia gum. In India the gum is known by the names karaya, kadaya, katila and kulio. India is the sole producer.

The trees from which karaya is obtained (unlike those that yield gum tragacanth) are big, reaching a height of 25 to 30 feet their trunks are large with a soft corky structure. The trees grow in sizable forests which are for the most part government owned, but many are on privately owned estates. The gum is obtainable throughout the year except in the rainy season, and the best quality is obtained during the hot spell, which is from March through the middle of June. Usually five or six incisions per tree, each incision about two feet long and deep enough to reach the heartwood, are made in the trunk by the natives. Sap or juice oozes out and collects in large irregular knobs in the incisions. The knobs are dug out in about three days and new accumulations grow in the same incisions. If the gum is not collected the wounds heal and fresh incisions in new places must be made. Trees generally yield gum for eight or nine months, then cease for two or three years after which they may again be tapped.

The gum is collected by natives usually when there is a scarcity of other work. It is taken to the villages where the merchants sell it to dealers in Bombay where sorting and grading is done, generally by women. The large lumps are broken up with stones and sorted in piles according to colour and freedom from bark and other impurities. The best grades are white, the poorest are dark brown to black.

Toothaker describes kuteera gum as the product of a large tree, Sterculia urens, in India. He states that a similar gum is yielded by Sterculia foetida. Still similar gums of the same general appearance are produced by Sterculia tomentosa and Sterculia cordifolia of Senegal, West Africa and

adjacent territory. In reference to these particular sterculia gums, they are yellowish to brownish in colour and sizes, with dimensions approaching two inches or better in their largest portion. In their raw form the gums are acid in nature and some samples are observed to give off acetic acid upon exposure to moist air. They swell up in cold water according to Toothaker and form a loose, flocculent opalescent jelly. Their acidity restrict their demand. It is probable that when they are collected under proper supervision and adequately graded, they fall in the karaya class and are used in the same manner as karaya.

There are a large number of grades of karaya, each shipper, inspector and dealer using his own group of designations. Weighing and bagging, a manual operation, is shown with typical shipper's grade markings. Although the products that enter the country are chiefly irregular tears, practically all that is sold to consumers is powdered, much of the bark being separated after powdering by an air blast which removes the bark, which has a lower density than the gum. Colours vary from white to gray and are often reddish. The gum is powdered for an additional reason. If it is unpowdered, addition of water yields a non-homogeneous colloidal solution. If finely powdered, each particle swells and the appearance and behaviour of the solution is more like a homogeneous solution. It is believed that the poorer grades are usually more acid and swell more. By means of an autoclave, the gum may be made soluble in water, and the solubilizing is sometimes so done by consumers. By this means, it more readily approximates the more soluble gums which it has largely replaced.

Although the knowledge of the chemical structure of karaya gum is meagre, there is some information which sheds light on its chemical make-up and behaviour.

The chief chemical constituent is the galactan gelose. The gum usually has the odour of acetic acid, and Peyer in 1925 reported also the presence of the odour of trimethylamine. Thrun and Fuller treated samples of the gum with sodium hydroxide, and by Kjeldahl determinations found the amount of volatile base to be equivalent to 1.1 to 1.2 cc. of N/10 alkali.

The gum shows an acid pH when in contact with water, and electrophoresis experiments show the gum to be a negative colloid. Addition of sulphuric acid or phosphoric acid to karaya solutions followed by distillation yields a volatile acid, at least a large part of which is apparently acetic acid. Fluck reports the volatile acid number varies from 13.4 to 31.3. Thrun reports 17.4 to 22.7. Expressing the latter results in terms of equivalent cc. of N//10 alkali, it is 4.5 to 5.8 cc. Thrun found that the amount of acid washed out of 1 gram of karaya using absolute alcohol as the extracting agent was equivalent to 3 cc. of N/10 alkali. Gabel added glycerine and water to karaya and titrated with N/10 alkali using phenolphthalein as an indicator. He reported an activity equivalent to 4.5 cc. alkali per gram of gum.

Thrun has shown that pH (and titrations) of karaya solutions must take into account of titrating, adsorption of dye if the pH is taken colourimetrically, time and method of adding solutions to the gum. He found that pH of gum solutions determined electrometrically, with quinhydrone, becomes higher after 24 hours. The apparent pH taken colourimetrically agrees at first with that obtained with the quinhydrone, but if the indicator is added to the water

used in preparing the solution the colour remains constant. If a small amount of ammonia is added to the indicator solution and this added to the gum, the pH measured electrometrically and colourimetrically both show a decrease as the solution ages. Typical pH taken over a period of time by means of indicator and electrometric measurements are shown.

Table 1. Colourimetric and Quinhydrone pH Values (1% solutions; indicator added to water before solution)

	No Ammonia				Ammonia Present			
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
Time Hours	Bromo-cresol pH	Green Quinhydrone pH	Phenol Red pH	Red Quinhydrone pH	Phenol Red pH	Red Quinhydrone pH	Cresol Red pH	Red Quinhydrone pH
0.8	4.6	4.63		9.42		8.77		8.56
3.2	4.6	4.62		9.03		8.58	8.5	8.50
23.5	4.6	4.64	8.3	8.72	7.7	8.02	7.7	7.99
29.5	4.6	4.71	8.1	8.50	7.4	7.53	7.3	7.22
50.0	4.6	5.03	7.8	8.14	6.8	7.10	7.0	7.00
76.0	4.6	5.13	7.7	8.14				

(a) Colourimetric pH

(b) Electrometric pH

6H. Fluck, Pharm. Acta Helv., 3,151 (1928)

7 L.F. Gabel, J. Am. Pharm. Assoc., 23,341 (1934)

8 W.E. Thrun, Ind. Eng. Chem., 27,1218 (1985)

Thrun explains the divergency by assuming that the gum particles absorb the indicator and are themselves more acid than the solution in which they are suspended, that the quinhydrone value gives pH of the solution while the indicator after sufficient time gives the pH of the particles. As acid is absorbed from solution by the particles in the first example, the quinhydrone pH rises after a time. Thrun adds further evidence to substantiate this theory by measuring the quinhydrone pH values from solutions prepared by dissolving in 0.05N acetic acid and taking pH reading 24 hours later. The results in Table 2 show that the gum, although acid itself, raises the pH (that is. lowers the hydrogen ion concentration) of the external acetic acid solution.

Table 2. pH of Karaya Gum Dissolved i[n] 0.05N Acetic Acid.

Grams—gum per 100 g. Solvent	Quinhydrone pH at 25°C.
0.0	3.10
0.2	3.50
0.4	3.56
0.6	3.58
0.8	3.64
1.0	3.69
1.3	3.76
1.4	3.84

Thrun measured the pH of solution[s] of karaya (Table 3), one set of solution[s] being made slightly ammoniacal at th[e] time the gum was dissolved, the othe[r] set made ammoniacal with the sam[e] amount of ammonia, but four hour[s] after the gum was dissolved. The pH

of the slightly ammoniacal solutions because of the gradual release of the acid by the particles which themselves remain more acid for some time. The pH in the second set was higher than that of the first set in each case. Thrun explains this behaviour as showing that the gum particles had adsorbed acid in the first four hours, and that this acid had not immediately been given up to neutralize the ammonia. It would seem likely that while this explanation sounds reasonable, there is at the same time a diffusion (or adsorption) of the ammonia into the gum as well as a diffusion of released acid from the gel to the external solution.

Thrun states that the differences in pH of the particles and the surrounding solution, the changing pH and the swelling of the particles point toward the establishment of a Donnan equilibrium.

Viscosity. The viscosity behaviour of karaya solutions reflects its usefulness in most of its applications more than any other single property. There have been several interesting viscosity relationships reported in the published literature, but there remains much to be studied in this field.

Table 3. Quinhydrone pH of Solutions Containing 0.665 Milliequivalent of Ammonia per Gram of Gum

Grams of Gum per 100 g. Solvent	NH_3 Added to Solvent H_2O,pH	NH_3 Added 4 Hours after Solution,pH
0.2	7.90	8.15
0.4	8.03	8.35
0.6	8.07	8.29
0.8	7.50	8.02
1.0	7.74	8.21
1.2	7.25	7.90

Karaya particles imbibe large amounts of water to swell to great size, but they do not dissolve or form homogeneous suspensions unless ground extremely fine or subjected to treatment in an autoclave. The latter treatment does "solubilize" to the extent of yielding a water-soluble gum like arabic, but viscosity relationships of such "solubilized" gum have not been published as far as known.

The degree of water absorption and viscosity of gum karaya varies widely with different shipments. Although it is generally assumed that viscosity is affected by the season of the year in which the gum is tapped and collected and conditions of growth, there is no assurance that the product of any one section of India or of any particular season of the year will produce a high-viscosity gum. The larger dealer tests each shipment and blends it with other shipments to make standard grades where possible.

As already pointed out karaya gum is ground before it is made into suspension in water. The importance of fine grinding is demonstrated in Table4.

Table 4. Effect of Grinding of Gum

Per Cent of Gum in The Water Dispersion	Screen Size of Powdered Gum	Properties of The Dispersion
2	200 mesh	
4	200 mesh	Coherent mass, flows easily
2	100 mesh	Thick and viscous, adheres to glass
4	20-30 mesh	Separation in clumps
		Full of air bubbles, slides freely and has free water
4	5-20 mesh	Free water visible that can be drained off.

Thrun and Fuller showed the very rapid rise in viscosity of karaya suspensions with increase in concentration. The results are tabulated in Table 5. Three samples of karaya were used. Number 19 was a typical high grade gum containing no brown masses and a few crystal-like masses, number 30 was a very high grade gum containing no crystalline masses and a large number of feathery masses, and number 14 was a fairly good grade but had more brown and crystal-like masses.

Table 5. Viscosities of Gum Karaya Dispersions in Water at 25°C.

Grams of gum in 100 g. of water	Apparent Relative Viscosity of Three Separate Samples		
	No. 19	No.30	No. 14
0.2	3.70	4.53	3.39
0.3	5.25	7.23	4.87
0.4	8.75	14.50	7.32
0.6	22.00	43.60	18.95
0.8	63.30	134.00	48.20
1.0	178.00	303.00	137.00
1.2	495.00	1,413.00	348.00
1.4	1,280.00	4,060.00	875.00

Dispersions stood 34 hrs. before measurements were made.

Karaya gum solutions are not finely divided homogeneous suspensions. They contain relatively large irregularly shaped masses that swell up and tangle with one another to give a high resistance to flow. The logarithm of the increase of viscosity over that of water is, according to Thrun and Fuller, proportional to the concentration. The relation may be expressed by the equation—

log $(n_s - n_o)$ /C=K

n_s = relative viscosity of the solution

n_o = viscosity of water = 1

C = concentration of gum in grams per 100 grams of water.

K = a constant.

The relative efficiencies of different samples may be obtained by reading from the curves or by calculating amounts of gum required to give the same relative viscosity.

These authors describe apparatus, procedure and logarithmic relationship which have been used in evaluating gums offered for sale or received. By using interchangeable capillaries of various lengths and bores which are calibrated to give relative viscosity of water it was possible to use fairly wide bores for the more viscous solutions and narrow bores for less viscous solutions. In this way, the danger of turbulence was eliminated. Calibration of the tubes was carried out in the following manner. The time required for 10 groms of solution (or water) to flow through the tube was measured in all determinations. A tube of narrow bore (Tube 1) was used to measure the time of flow for water and for a dilute solution of gum. The rime of flow for the solution was then determined using a tube (2) of wider bore. Water run through tube of wider bore would experience turbulence but the dilute gum solution does not. It is possible then with the data obtained to calculate the non-turbulent viscosity of water in tubes. Employing a more concentration gum solution, time of flow is determined in tube (3) of a still wider bore and the relative viscosity of water in tube (3) calculated therefrom. In this way relative viscosity without turbulent flow can be obtained over a wide range of viscosity.

Gable measured viscosities of karaya and tragacanth solutions using a MacMichael viscosimeter and reports that karaya solutions are not as thick as tragacanth, that karaya solutions be-

come thinner with time and that heating the karaya solutions reduces their viscosity. Neutralization of karaya with potassium hydroxide causes it to be stringy and tends towards lowered viscosity with ageing and heating.

Glarum using a Stormer viscosimeter demostrated that mucilages of karaya, like tragacanth and thick textile printing colour pastes, show with increasing load a sharp rise in fluidity, which is measured in revolutions per second divided by the load. The increase in fluidity is not as rapid as that of tragacanth and accordingly would not have as false a body as the tragancanth. The viscosity of gum arabic, on the other hand, shows a constant fluidity with varying loads.

INDIAN GUMS

Many other tropical trees produce gums which are collected locally and when sufficient in amount reach the export market. When there are insufficient amounts, gums from different trees may be lumped together to give irregular shipments of non-reproducible quality. The chemistry of those gums is little understood and at times their botany is the subject of dispute. The appellation "Indian gum" or "East Indian gum" is one of confused terminology. Occasionally distinctly named and generally recognized parcels of particular gums reach the market and for this reason they are classified here.

The dhak or palas tree, Butea frondosa, grows widely in the forests of India. It yields a dark red gum which ordinarily contains some tannin. It is a hydrophilic colloid but most of its application is local. There are no recognised gradings.

The Chittagong tree, Chickrassia tabularis, produces a water-soluble reddish to amber-coloured exudation which sometimes reaches the market as an admixture in Indian gums.

The wood apple tree, also known by the natives as the elephant tree, Feronia elephantum, yields a yellow to reddish soluble exudation which is collected locally and employed in native industries in connection with dip dyeing and colouring.

Trees of the species Melia azadirachta, classified by some botanists as Azadirachta indica, are tapper and the amber-coloured gum collected therefrom to become a component of some of the East Indian gums. Its quality is not equivalent to that of ghatti.

Moringa gum is from Moringa pterygosperma which is called the horse radish tree by the natives. Collection is irregular and there is question as to whether the tree exudation is a true gum or a mixture of gums and resins. It has some local application in connection with batik dyeing.

Several species of terminalia such as Terminalia arjuna, Terminalia bellerica, Terminalia catappa, Terminalia chebula, Terminalia tomentosa, are tapped for yellowish to reddish gum exudation by native collectors who sell them to traders. These terminalia materials in certain areas are important contributors to the crude East Indian gums. Ordinarily these gums are inferior in their thickening or adhesive powers to medium grades of ghatti, karaya or tragacanth.

The East Indian varieties of acacia have been discussed in connection with gum arabic.

The siris tree, Albizzia lebbek, Albizzia amara, Albizzia odiratissima, Albizzia procera, Albizzia stipulata, a small thorny shrub-like growth, is fairly widespread in India and the Far East. It yields a yellow to brown hydro-

hilic gum which swells readily and orms soft clear jellies. The gum is occasionally met as an admixture in the poorer grades of arabic.

The cashew family, Anacardiaceae was originally a native of the American ropics, particularly Brazil and the West Indies. It was introduced into the East by the Portuguese and is now ound widely throughout the Orient. The tree is a dome-like evergreen growing to a height of 30 to 40 feet. It is best known as the source of the cashew nut which is an article of commerce and he important paint material cashew nutshell liquid. The tree yields from 5 o 12 pounds of a water-dispersible gum which may be collected when the sap is ising.. The gum exudes from the bark, nd locally finds application for many pharmaceutical purposes as well as a ubstitute for gum arabic. It is stated hat it has good properties as a mucilage and is particularly valuable as a coating o protect against the depredations of nsects. Applicationwise, the gum is not competitor of gum arabic in that it hows solubility in cold water, but the ndissolved part disperses to form a soft lear jelly. The colour of the gum is usually dark red. The antiseptic or rotective effect is associated with the atural phenolic type compounds which lay such an important part in cashew utshell liquid application.

Mahua gum from Bassia longifolia nd semla gum from Bauhinia retusa nd Bauhinia varegata are collected ocally in different districts in India and o some extent are used in food preparations. Their qualities are relatively oor.

Chironji gum is obtained by tapping ccidentally or intentionally, the Buchanania latifolia. In some respects this um resembles karaya and when vailable in large enough amounts may reach the market under a karaya designation.

Kino gum is from the tree Pterocarpus marsupium. When separate it is usually dark red in colour, is partly soluble and forms a soft jelly. Commonly, however, gum kino is another name for dragon's blood which is a resinous substance obtained from the fruit of several species of small palms growing in the East Indies. Dragon's blood is not a gum but a gum resin and its commercial value depends upon its insolubility in water and its solubility in organic solvents.

Soap-nut tree gum, locally known as ritha, comes from the tree Sapindus trifoliatus. It shows hydrophilic colloidal properties to a limited extent, but the gum is often contaminated by other products from the tree. It finds local usage in native arts and industries, but rarely enters international trade except in some specialized pharmaceutical applications.

The gums of Cochlospermum gossypium according to Robinson, yield 14 per cent of acetic acid upon distillation. These gums lose 19 to 21 per cent of their weight on heating at 100°C. and show mineral contents of 7 to 9 per cent. They require 13 to 16 per cent of their weight as potassium hydroxide for neutralization. They contain galactan and araban, but less of the former than in gum arabic. It is probable a third carbohydrate exists. They swell up very quickly on treatment with water to form nearly transparent gels which, however, are so brittle that they can be pulverized by gentle rubbing into a very large number of minute angular particles. After rupture these particles do not further coalesce. The gum is of interest scientifically but has no commercial value in comparison to other materials.

Manufacture of Glass Signs

Glass sign work requires more careful workmanship and attention to detail than any other. Considerable progress has been made in process manufacture of glass signs. The offset Swedish printing method has been entirely discontinued on flat surface glass work because it was too costly, and the screen has replaced it by cutting etching costs 75%. Another new achievement was the adoption of chemical gold solution, eliminating gold leaf gilding. The improvements save fifty percent in costs and also are of greater durability. A few more additions in gilding worth mentioning are: copper, which gives a red gold colour which resembles the new flesh colour glass. Lighter shades are produced by adding a trace of platinum or palladium. Gun metal finishes are produced by a flow of lead nitrate in solution. Roman gold or drak gold is produced by a thin solution of gold and double coated with copper. Light gold can be made by a thin coat of transparent silver and double coated with genuine gold chloride solution; or better than that would be the most durable solution, gold chloride and a trace of platinum chloride, which is termed as an everlasting mirror.

The formula of acid resist for glass etching will not be mentioned, due to fire hazards in its manufacture, so we suggest getting a supply ready mixed. For the average five-minute acid etch, one coat of resist is sufficient. For deep etching we suggest two coats of acid resist, and for a depth of [illegible]″ or more, we advise three screenings which will resist acid without danger of fuming for over seven hours The hydrofluoric acid can be purchased in various strengths, 48, 52 and 60. The most commonly used is 52%, to which fifty percent water is added. This proportion makes a perfect mixture. A flat etch, or commonly called, mat finish is laid flat in an acid tank, etching after cleaned and brushed for six minutes, after which it is drained and washed. The resist is washed off with hot water or dipped in a naphtha tank and cleaned with sawdust, and afterwards washed with whiting and ammonia water and then rinse.

The deep etch imitation chipping is set in acid tank upside down so that the silicate may drop out, forming irregular designs. Four pegs will be necessary to hoist the glass from touching the bottom of tank; a better and more satisfactory etch may be gotten by this method.

After every batch of glass is etched, and addition of stronger acid must be added. The acid tanks should be made of [illegible]″ acid-resisting lead, the corners folded instead of cutting to eliminate soldering. The tanks should be designed for covers because the gas of hydrofluoric acid escapes very readily, which weakens the solution. After the day's work or idle time, the covers are let down to preserve the strength of your etching acid, which also prevents the furmes escaping and doing much damage to the which surface of all glass that it may get in contact with. A well ventilated room with a 30″ exhaust fan is necessary; all precautions must be used not to inhale the fumes, as they are very dangerous. Heavy duty rubber acid gloves should be used for handling glass while putting in or taking articles from the acid tank.

When these operations are completed, washing and then gilding is considered the next step. The gilding table is similar to that used by mirror manufacturers. The table should be prefectly

level, covered with heavy cotton cloth at least five coverings to absorb moisture and collect the surplus water poured off the glass when gilded. The table is heated to about 120 degrees F. and in most cases heated by a series of steam pipes four inches apart, covered with soap-stone or slate and also cotton covering.

The most commonly used silver for pouring is the tartaric acid solution, for which we will give a complete formula. The first operation is called scratch polishing. This is done either by a hand block felt pad or by a rough wheel. All fine hair line scratches and rubs are polished out, then washed clean. A tinning solution is made to sensitize the glass for sliver. To one gallon of distilled water, 5 grains of tin muriate A.R. is dissolved and poured on clean (while wet) glass, and then rinsed with distilled water. Now we are ready for the silvering.

Mix 8 oz. of silver nitrate C.P. and ½ gal. distilled water. Dissolve and stir with a glass rod. Then add 10 oz. of ammonium hydroxide, 28% C.P. The solution will be turbid. Then drop by drop of ammonium is added until the solution clears. This is what we term as Solution 1.

To one gallon of distilled water, 4 oz. of tartaric acid granulated is dissolved. When completed this is solution 2.

Distilled water	1	pt.
Solution 1	3	oz.
Solution 2	3	„

Mix thoroughly and pour on glass, and in ten minutes a precipitated silver in metallic form will adhere to the glass.

Rinse with common water and dry. For a bright edge of silver around design or lettering, this can be arranged by cutting a screen to match. The paint for this should be neutral. The varnish in this, black preferably, should not contain rosinic acid because it may be injurious to the silver. After the colour is dry, it may be brushed or dipped in a weak solution of water and nitric acid and the surplus silver will be removed, then rinsed and dried. We are now ready for final operations, which are the background colours. We recommend a chemically pure colour with as little in earths as possible.

A good gold formula is given in detail.

Gold chloride to solution 1	1	oz.
Distilled water	1	gal.
Potassium hydroxide A.R. solution 2	2	oz.
Distilled water	1	gal.
Distilled water solution 3	½	pt.
40 S.D. alcohol	½	pt.
Sucrose	5	gr.
Glycerine	2	drops
Formaldehyde	5	gr.

To 16 oz. of number (1) solution add 112 oz. of solution (2). This makes 1 gal. of liquid gold ready which should be mixed three hours in advance for ageing. We recommend that it should be used before two weeks as it spoils with age.

The tinning is required like that of silver. After rinsing, a priming coat of weak silver nitrate solution is poured and rinsed. Then to 1 pt. of gold solution ready mixed, after proper ageing, add one full eye dropper of Solution 3, mixed by pouring back and forth several times, and then pour on glass. A cold table may be used, the only difference being that the amount of gold precipitation does not compare with that of a hot table. A fairly solid film of gold will be deposited in about eight minutes, then it should be properly rinsed and a coat of tartaric acid solution of silver should be deposited, which will be opaque when completed.

To be successful in silvering, proper proportions in the ingredients must be exercised. The working of the solutions must be exercised and watched with care. Should there be no immediate deposits, it can be assured that the proportions were not accurate. We would advise never to use a chamois skin for drying the excess

surplus liquid after the completion of either gold or silver gilding. Years of experience have taught us that a chemical reaction takes place which mottles the reflection.

A transparent mirror has been used in advertising and other mediums, so we will give you the following formula. A hot table is not necessary. The method, if properly used, will be very durable.

STOCK SOLUTION

(1) Nitrate of silver	4	oz.
Distilled water	60	,,
(2) Potassium hydroxide	4	,,
Distilled water	60	,,
(3) Ammonium hydroxide, drop by drop to clear the above mixture.		
(4) Sucrose or cane sugar	1	oz.
C.P. sulphuric acid	5	drops
Pure alcohol	½	oz.

Always remember four oz. of solution to a square foot of glass, so in mixing the above solution, a pitcher that will carry sufficient liquid should be used. The gilding takes place immediately, and in order to avoid spotting the liquid must be poured at once. Estimate the amount of solution needed. Then mix 1, 2 and 3. This mixture when cleared with number three is considered ready to pour by adding 10% of solution 4. It will take considerable time and effort to understand the proper action, to make a good transparent mirror, so don't be discouraged, if you should fail the first or second time. The stock solution will keep in a closed bottle, but do not attempt to save the mixed solutions 1, 2 and 3. They are dangerous, especially in a hot room or standing on a hot gilding table.

The first covering will be transparent. Another coat can be poured, and if a quick opaque mirror is wanted, the third coat can be poured and then shellacked when dry. The method has proven to stand up very well. A coat of Egyptian asphaltum, thinned with toluol, is a very good backing; shellac is not necessary in this case.

A few points to be remembered in handling glass after it has been rough: Be careful that you do not touch the surface to be silvered with your hands; if you do, it will bear a mark and the solution will not deposit properly. The glass should be handled by the edge so no contact with the hands will be made. Double coating is not necessary. An opaque deposit can be precipitated on the first pouring. About four ounces of liquid solution is ample for each square foot of silver.

All possible care must be taken in keeping measuring glass pitches and bottles so that they are at all times chemically free from foreign matter. The best way to keep them clean is to pour a dilute solution of aqua regia or hydrochloric acid into them, rinsing with water, then whiting and ammonia for final wash. Keep them upside down while not in use. It is not necessary to filter the solutions if care is taken in all operations. The purity of your distilled water may be tested by adding a few drops of sliver nitrate in water, and if it becomes cloudy, the water is not pure.

To remove silver or gold stains from your hands or clothes, wash with a dilute solution of 1 part of sodium cyanide to 50 parts of common water. After stain disappears, wash immediately with water, so no trace of cyanide may remain; should be kept away from open sores, for it is very poisonous. Keep in bottle and label with large letters (Poison) so you may detect it at a glance.

A white acid etch may be fumed on glass by the following process.

Water	22%
Ammonium bifluoride	38%
Sodium fluoride	20%
White syrup	10%
Hydrofluoric acid	10%

This formula will white acid-etch in 2 minutes. The solution must be agitated to avoid spotting. Rinse immediately in warm water so that no fuming will occur. The fuming or white acid etch will be most effective in a warm, well ventilated room. We suggest the above mixture be made at least two days in advance, so that all ingredients will amalgamate properly.

COPPER ELECTROPLATED SCREEN

In many industries especially where vitreous or ceramics are used, a strong type of screen is necessary. It is possible to make a copper screen by first taking a piece of copper mesh wire, thoroughly cleaning and placing the design or portion to this wire with a resist. Either shellac or lacquer may be used. It is then coated with the resist on the opposite side, over the same pattern or design. It is then put a coating of thin copper over all except the resist. If lacquer is used the resist is removed with acetone, and if shellac is used the resist is removed with alcohol.

Complete New Ways in Cosmetic Creams

By H. C. Janowitz

We are sorry, that we gave you the wrong advice for the last 35 years. These lines will stand in future in every advertisement of a factory manufacturing night creams and skin-foods. Let us start with some established facts:

The normal water contents of the skin is in the region of 72%.

The skin gives water off continuously to the air. Therefore our skin needs water and needs it badly.

If you put some cream on the face, which consists only of animal and vegetable fats, it disappears absolutely into the skin and produces in some cases even a dryness of it. To overcome this obstacle, the old Pharmacopoae used the Ceratum Galeni, which consists of 100 gr. Cera 400 gr. of almond oil and 300 gr. of water.

To inhibit the continuous water spending property of the skin, we use mostly a face mask: If you prevent the water spending possibilities of the skin through closing the pores of the face for a certain time, the skin has time to rest and to recuperate.

As we said above: A cream, which consists only of vegetable and animal fats disappears into the skin and produces in some cases even a dryness of the skin. Therefore an emollient cream requires the presence of substantial amounts of mineral fats (de Navarre, Chemistry and Manufacturing of Cosmetics).

In night creams with a lot of mineral fats, the animal and vegetable fats nourish the skin, the water helps to restore part of the lost water to the skin and the mineral fats spread like a face mask upon the face, acting like a face mask, to close the pores and to recuperate the skin.

But why not feed the water directly to the skin, together with the fats, which the skin needs for recuperating and restoring?

If there are some excemas, the doctor forbids water, but prescribes 2% solution

of boric acid, this solution has about the pH, and the acid value of the skin, or is at least the nearest to it.

The world success of some brand of sportcream shows, that a cream with a lot of water is beneficient to the skin. About 95% of the fat contents of this cream is mineral fat. Now imagine this cream made with real good vegetable or animal fats, which will be absorbed absolutely by the skin.

The use of sodium chloride solution or even diluted sea-water to restore isotony to the skin would be facilitated. Even a real skin-food could be created, through substituting water with glucose solution.

Below you will find some formulas for such creams, which can be changed to own specification (even with addition of some mineral fat, if the cream should be used as a powder foundation, to close the pores).

But for the use of boric acid, sodium chloride and especially for its special water binding and spending property W/O Emulsion are indicated. Addition of Tocopherols (Vitamin E) should be done for the double purpose of Vitamine addition and antioxydants. Addition of 75000 Units of Stilbestrol makes a good hormon cream, which will be absolutely resorbed (this means about 7000 Units for each ounce of fat just the right amount).

Arachide oil	200
White beeswax	25
Cetylalcohol	10
Woolwaxalcohol	20
Lanolin anh.	80
Glycerin	30
[illegible]	
Magh. sulph	0.2
2% solution acid boric	634.8
Softer	
Soya oil	205
Woolwaxalcohol	20
Cetylalcohol	10
Lanolin anh.	100
Sorbitol	30
Magh. sulph	2.0
Solution acid boric	633

The boric acid solution can be substituted by solution of sodium chloride, physiological or a solution of one part of sea-water and 3 parts of fresh water.

These creams are in their composition of only natural raw materials absolutely not allergic.

Therefore as for perfuming the use of real distilled rose or orange-flower-water is advised, instead of distilled water, compounnding the real, good inimitable smell of real flowers with the soothing, astringent and anti-inflammation effect of them.

A NOTE ON THE CONTROL OF AMMONIUM THIOGLYCOLATE SYSTEMS IN HAIR WAVING

The current trend toward home permanents has created many new products as well as many new problems. The Thio acid type permanent, being extremely critical during manufacture, necessitates several control tests to ascertain and verify the purity of the product.

The primary consideration being the control of the finished product. First, the pH should be taken immediately upon manufacture of the product, before bottling and packaging. This should run from pH 9.0 to 9.6, preferably in the range of 9.2 to 9.5, inclusive.

The colour should be checked against a standard for possible change, due to contamination of the product by iron or other catalysts.

A sample should be assayed for Thioglycolate concentration by iod[illegible] metric titration, or other approv[illegible] methods.

Finally, one sample should be [illegible] in an oven at 100°F to 120°F, [illegible] another sample in a [illegible]

to 40°F for 30 days, after which, the pH should once more be checked and the Thioglycolate again titrated iodometrically.

PROCEDURE AMMONIUM THIOGLYCOLATE TITRATION

Titration of Ammonium Thioglycolate is made on a 1 cubic centimeter sample of the latter, using 1|10 normal Iodate solution as a titrating agent. The one cubic centimeter sample of Ammonium Thioglycolate is treated with about 10 cubic centimeters of dilute sulphuric acid in a small Erlenmeyer flask, to which is also added several cc of soluble starch solution. With a 1|10 Iodate solution in a 50 cubic centimeter burette, this titrating agent is slowly added to the material in the Erlenmeyer flask until a permanent blue end-point is reached. The amount of Iodate solution used in reaching this end-point is called the titre of Thioglycolic Acid in the Ammonium Thioglycolate tested.

To determine the percent of Thioglycolate Acid in the diluted Ammonium Thioglycolate in a cold-wave solution, the following equation is used.

Percentage Thioglycolic Acid:

$$\frac{\text{Titre} \times \text{Normality of Iodate} \times 9.21}{\text{Specific Gravity.}}$$

The titre is obtained by the procedure indicated above, the normality of the Iodate is 1|10 normal. the 9.21 has a reference to the molecular weight of Thioglycolic Acid and the Specific Gravity will be found on the specifications label, coming with the shipment of Ammonium Thioglycolate, this value usually averages approximately 1.2.

To determine the titre of the materials shipped from a vendor from the concentration figure given in the specifications of the shipment; multiply this latter figure by the specific gravity and divide the total by .921. Thus if the Thio has a concentration of 55.5% and the specific gravity is 1.2, multiplying both gives 66.6. This divided by .921 gives approximately 72, which would be the titre of the Thio in question.

A 5% solution would have a titre of 5 cubic centimeters, therefore, to determine the degree of dilution of vendors Thio, if its titre were 72 cc this would be divided by the 6 cc for the 5% solution, giving a dilution factor of 12. To avoid fractions in calculation, it is best to multiply the 12 by 10, making a total of 120. Dilution would therefore be 110 parts of water and all other ingredients to 10 parts of Ammonium Thioglycolate. Thus, if 3 parts of 28% Aqua Ammonia and 2 parts of Cloud are to be used, there would be a remainder of 105 parts to be applied as distilled water out of the original total of 10 parts so that the final formulation would be 105 parts distilled water, 10 parts Ammonium Thioglycolate and 3 parts 28% Aqua Ammonia, 2 parts Cloud. This mixture would then give a 5% dilution at a pH of 9.3.

Very frequently raw materials differ from one lot to another, making it almost a necessity to run controls on them also. The following example is cited.

EXAMPLE OF CONTROL PROCEDURE ON AMMONIUM THIOGLYCOLATE RECEIVED FROM VENDORS

The percentage concentration of vedors sample is noted and recorded. Specific gravity is taken on a sample. A separate sample is titrated with .1 N Iodate solution and the titre recorded.

The control is checked in the following way:—

Known concentration of acid is	53.7%
The specific gravity checks out	1.2
The normality of the Iodate solution is	.1
A reference to the molecular weight is	9.21

The titre checks out about 69.96cc.

Equation:

$$\% \text{ of Thio Acid} = \frac{(\text{Titre X Normality of Iodate}) \text{ X } 9.21}{\text{Specific Gravity}}$$

$$53.7\% = \frac{(69.96 \text{ X } .1) \text{ X } 9.21}{1.2}$$

69.96X9.21

—AE—

$$53.7\% = \frac{64.4316}{1.2}$$

53.7%=53.694%.

If a wetting agent is to be incorporated into the wave lotion, extreme rare should be exercised in choosing one. One must choose an agent that will be compatible with the alkanity which makes the product useful. It has been the author's experience, that one of the best agents to employ is Sodium (Alkyl Sulphate in an approximate Triethanolamine Lauryl Sulphate in this product.

In connection with the use of a suitable wetting agent, not long ago, I encountered some very annoying trouble. I had made a batch of permanent wave lotion and after checking the Thioglycolate content, which was a satisfactory 5%, and taking a pH, which ran pH 9.35, I stored the samples in an oven for a 30 day stability test. A check of the pH after 10 days revealed a drop to pH 8.75.

The pH continued to drop for the full 30 days, at the end of this time the pH was 8.2 and upon titration, the Thioglycolate content ran 4.25 per cent. After several weeks of work, the trouble was traced to the wetting agent, which was reacting with the free alkalie, thus reducing the pH. A new wetting agent, namely triethanolamine Lauryl Sulphate, was substituted and hennceforth, no more trouble.

The perfume can also give no end of trouble, in such media as Alkaline Thioglycolate solution, so that just as much care should go into the selection of a perfume as goes into the selection of the wetting agent.

In closing, a word might be said regarding the manufacturing procedure. It is recommended that all solution be mixed in either rubber or saran plastic crocks. Stoneware may be used, if these are either unobtainable or deemed too expensive. Rubber, or saran hose and connections are also recommended. An aluminium stirrer may be used if necessary. The hands of personnel coming into direct contact with the lotion should always be protected by wearing rubber gloves.

—ALCHIMIST.

Implements and Machines for Rice Farmers

In the small rice fields of Japan farmers use cheap, simple and mostly manually operated implements and machines. Most farmers, because they do not maintain cattle rely on hand-operated implements.

With the Japanese method of rice cultivation having found favour with our farmers, many of these implements could be used for our rice lands in India too, but this will mean some slight changes in our cultural practices so that they can be worked efficiently. Some of them require minor changes because of the difference in the size and shape of the paddy grown here and in Japan.

The Indian Agricultural Research Institute has been importing some of these Japanese implements from time to time for trial here. Some observations on these will surely be of interest to our rice farmers.

THE PLOUGH

A steel plough is used in Japan for the rice fields. This plough seems to have some of the features of the country plough used by the Orissa farmers. It also has the mould board effect of the western plough. The hitching arrangement of the Japanese plough is different, however, from that of the Indian country plough. It has a short beam as only one animal is used for ploughing in Japan as in some of the other Far Eastern countries. This naturally is a handicap here since our bullocks are always used to work in pairs.

The point of similarity between the Japanese plough and the Orissa country plough lies in the plough bottom. Both of them possess the suitability for working in land under water for puddling the soil.

Again the plough used in West Bengal in the rice fields is very much similar to the Orissa plough. However, in most rice-producing states of India, the plough used for wet and dry cultivation is the same. In such states, may be, it will be worth while to try rice land plough from Japan or from Orissa.

RICE AND PUDDLER

There does not seem to be any specific implement used for puddling in the rice land in Japan. A wooden implement is being used in Burma for puddling in the rice land and also for crushing clods in the dry lands. In South India a firm is manufacturing a cast iron puddler which is being used in some of the states. Experiments are in progress on the possibility of using tractors and power implements for this purpose. A large mechanised farm in Gwalior has successfully been using a light wheel tractor for this purpose.

American scientists believe that puddling is not necessary for rice cultivation but this may be due to the very limited acreage (two million acres) under rice in the U.S.

The puddler being manufactured in India is a very effective and labour-saving implement and may be tried with advantage.

In Japan, it is said that a mould board plough of the type used in the West is being employed for turning under of green manure crops. In Northern India a similar plough is being used to fertilize land with green manures. In some parts of South India where green leaves and other vegetation are used for manuring the rice fields, another type of implement

called the green manure trampler is commonly used.

SEED DRILL

A transplanted rice crop is known to give a higher yield than a broadcast crop. However, in Japan seeds are sown mostly in rows. Seeding is done with a hand-operated paddy drill in fields with a little standing water and hence no furrow openers or earth-closing discs are needed. Because of the difference in the physical shape of the paddy fields in India the Japanese seed drill will need considerable modifications before it can be used under our conditions.

RICE LAND WEEDERS

In our country, excepting for tiny hand-worked implements, no manually-operated or bullock-drawn implements are available for removing weeds from rice fields. The use of such machines, however, requires row planting. The Japanese rice land weeders are simple machines for weeding the rice crop. These manually-operated implements can be carried by one man and worked by a single person and continuously for eight hours without feeling exhausted. While effectively pulling out the weeds, they do not injure the rice crop. These weeders can usefully be employed in places where paddy is sown in rows of transplanted with 9 inches to 12 incnhes between rows, as these implements are suitable for row widths of nine inches and above. Since the implements require at least an inch or two inches of standing water, they connot be worked in dry fields. In Japan when row widths are bigger, they use three or four row weeders pulled by a single animal. Two firms in India are manufacturing rice land weeders for Indian farmers.

PEDAL-DRIVEN RICE THRASHERS

Very effective though small rice thrashers are being used in Japan. These machines are available in two sizes, one to be operated by a single person and the other operated by two. Both the types are pedal-operated. It is reported that with an additional attachment the thrashers can be used for wheat, oats and barley also.

The thrashers have a rotating cylinder on the periphery of which bent steel wires are fixed. When this cylinder rotates and the paddy cars are brought in contact with the steel wires, the grain is separated from the straw.

Agricultural Departments of most of the rice producing states in India have tried these machines and though their opinion regarding its working is not unanimous, they have found it to be a labour-saving device. In such states where labour is cheap, however, these do not seem to be economical. Four Indian firms, at present, have started the production of the single person operated pedal type rice thrashing machines, their sale price varying from Rs. 90 to Rs. 120.

POWER DRIVEN RICE THRASHERS

Small engine or motor-driven thrashing machines are also used in Japan. These are small enoagh to be conveniently carried on the shoulders of two men even on the narrow bunds of the rice fields. The thrashers are so designed that the rice straw is not damaged in any way and can be retained straight and unbroken. This kind of straw is needed for the Japanese farmer for making mats and ropes because fibres are not available. This aspect of their design, however, is not of particular advantage in India because we do not make use of rice straw for any such purpose.

GRAIN GRADERS

In Japan, the farmers use grain graders, which do not depend upon wind for their working. The graders are used for separating the weed seeds, chaff and dust from paddy grain after thrashing. The grader can be hauled into the fields by two men. By using this machine the solid grains are separated for our shrivelled ones and weed seeds are also collected

separately. However, if these machines have to be used in India the grain screens will have to be modified to suit the size and shape of the paddy grain here.

PROCESSING PADDY

Straw and paddy are very economically made use of in Japan. For processing these, they have efficient machines of a cottage industry type. For straw three manually-operated machines are in use. They are the straw cutter, straw mat weaving machines and the straw rope-making machine. These machines are not described here as we do not make use of straw as the Japanese do. These machines, however, can be used for other fibres in India.

Three different machines are also used for processing paddy. They are the hand-operated paddy sheller, power-operated paddy sheller, and the power operated rice polisher. The paddy shellers remove the hull and do not affect the rice kernel in any way. The machines have a rubber band on the surface. This hard-faced rubber can be renewed whenever needed. It is this rubber roller which is flexible that is responsible for the high turn-over obtained from the Japanese rice shellers. The rollers are adjustable for different sizes of grain. A firm in South India is manufacturing a modified type of rice sheller to suit our conditions and to give a better performance.

Rice milling machinery is produced in India since a long time which is also exported to Burma and East Africa. This type of machinery is based on the original German design (Engleberg type) which is also in common use in the U.S.A. to-day, but Japanese machines are of small size, low in investment and better in performance.

The above machines were secured through the Indian Embassy in Tokyo for trial at the India Agricultural Research Institute, New Delhi.

—INDIAN FARMER.

Scientific Researches and Inventions

DEVICE HELPS POLIO PATIENTS TO SEE AND HEAR MUSCLES

A device which announces both to the eye and to the ear the action of muscles is being tested on polio (infantile paralysis) respiratory patients. Long used for diagonistic purposes, the electromyograph, as the device is called, may now prove to have therapeutic value as well.

The function of the electromyograph, in brief, is to "broadcast" muscle impulses. Small electric contact points are fastened to the patient's chest or limbs, and the machine picks up muscle spasms electronically.

"Since the patient can hear these spasms as they come through a loud-speaker and see them as they are reproduced in wave form on a special screen, he is often encouraged to use those muscles which appear to him to be hopelessly impaired," says Dr. George H. Koepke.

"An electromyograph, which provides both the doctor and the patient with a visible picture of muscular spasms, tells the patient what muscles he is using, and therefore is a guide in developing a better pattern of breathing," Dr. Koepke reports.

TV FOREST FIRE DETECTOR

Television cameras are being used to locate forest fires and are proving more efficient in some ways than human watchers.

The cameras are mounted in plastic domes on top of high towers and are rotated continuously, taking two minutes to make a complete revolution. Thus the cameras can the surrounding countryside exactly as human watchers do, but in a more deliberate and systematic manner.

The cameras are equipped with telephoto lenses. On a clear day, they can record a picture of a cow munching grass four miles away, and can show small wisps of smoke from fire that are 20 miles away.

NEW RADIATION EQUIPMENT

New radiation equipment costing less than $1,000 but with an intensity equal to $2,500,000-worth of radium has been developed by atomic scientists at the University of Notre Dame and the Oak Ridge National Laboratory. The new source, which makes use of radioactive cobalt, will bring atomic radiation research to the small colleges and research institutions which have not been able to afford more expensive equipment.

Basically the device consists of a battery of 24 brass cylinders strapped around a central cylinder and extending seven feet below the surface of a concrete floor. In four of the cylinders there is an arrangement of radioactive cobalt slugs on three different levels. An operator may lower a sample in the inner cylinder and expose it to radiation intensities up to the equivalent of 100 grams of radium.

NUCLEAR "PACKAGE" POWER PLANT

A full-scale nuclear power plant so compact it can be transported by plane in sections to remote areas to provide heat and electricity is to be built at Fort Belvoir, near Washington.

The model plant, which will generate enough electricity to supply a town of about 1,700 people, is specially planned as the forerunner of small nuclear power reactors to be used in areas where transportation of conventional fuels is difficult and expensive.

The reactor will be constructed by a private firm on the basis of competitive bids. The plant is expected to be in operation within two or three years.

Dr. Lawrence Hafstad, director of reactor development for the U.S. Atomic Energy Commission, said the new experimental reactor was a step in the direction of lower power costs and would provide scientists with valuable experience.

Dr. Hafstad described the projects as "the beginning of civilian use of atomic power." He said the AEC hopes that eventually perfected models of this plant will replace conventional steam units and coal furnaces.

NAVIGATING INSTRUMENT FOR JET PLANES

Modern jet airplanes move so fast that it is extremely difficult for the pilot to keep track of his location. A few minutes flight off his course and he can be lost. He must constantly check his speed and direction to keep track of his approximate position.

A remarkable new instrument called a "ground position indicator" is now being built to do this navigational reckoning automatically for the pilot. Regardless of how much he turns and twists the plane at high speed, the new instrument constantly shows him the plane's position—and gives him a reading of his position expressed in latitude and longitude.

Developed by the Ford Instrument Company at Long Island, New York, the ground position indicator has almost 2,(parts, but occupies less than 1½ cubic f of space. Commercial airlines wh routes are mainly over water and rem from airway beacons have shown a ke interest in the new device.

CORTISONE FOR SKIN DISORDERS

Cortisone, used effectively in treatment of rheumatoid arthritis, help patients with severe and distres chronic skin diseases, two New Y physicians reported recently in Journal of the American Medical As ciation.

This use of cortisone is not exp mental; in many cases it has already p longed the lives of patients with skin orders ordinarily considered fatal. It brought relief and rehabilitation to oth suffering from chronic diseases t ordinarily would incapacitate them. F years' experience, the doctors say, sh that those being treated did not acq resistance to the drug and there was need of continued increase of dosa Neither was there any addition to drug. In most cases, the amount gi could be progressively decreased and disease was kept under control while patient gradually learned to do with the hormone.

The disorders treated were first th not ordinarily fatal but in their sev forms often ruinous to life—such as sev atopic dermatitis; and second the ordina fatal but often chronic skin diseases, s as various forms of pemphigus.

INFLUENZA MIXTURE

I.

Solution of ammon citrate	1 fl. dr.
Spirit of sal volatile	20 min.
Tincture of aconite	3 ,,
Tr. camphora co.	30 ,,
Syrup of tolu	½ fl. dr
Chloroform water	to 1 fl. oz.

Dose: 1 fl. oz.

II.

Potassium citrate	20 gr.
Ammonium carbonate	5 ,,
Spirit of ether	15 min.
Spt. Ipecacuanha	10 ,,
Syrup of tolu	½ fl. dr.
Camphor water	to 1 fl. oz.

Dose: 1 fl. oz.

III

Liq. Ammon. acetate (conc.)	1½ dr.
Spt. nitrous ether	2 ,,
Spt. ammonia aromatic	1 ,,
Spt. chloroform	45 min.
Spt. of ipecacuanha	45 ,,

ASTHMA INHALATIONS

I.

Stramonium leaves, finely cut	63 gm.
Lobelia, finely cut	12 ,,
Moisten with a solution of potassium nitrate	25 ,,
Water	50 ,,
Oil of lavender	q.s.

To every 100 gms. of mixture, add 4 drops of oil of lavender, distributing the oil as evenly as possible.

A certain quantity of the liquid is to be poured on a pint or so of boiling water and the vapour inhaled.

II

Stramonium	2 oz.
Lobelia	1 ,,
Eucalyptus leaves	1 ,,
Black tea	1 oz.
Potassium nitrate	1½ ,,
Water	1½ ,,

INFLUENZA MIXTURE

Sodium salicylate	10 gr.
Potassium bicarbonate	5 ,,
Ammonium carbonate	4 ,,
Liq. ammonium acetate	1 dr.
Tr. cinchona	10 min.
Spt. chloroform	10 ,,
Water to make	1 oz.

Makes 1 dose; to be taken every 4 hours.

INFLUENZA & FEVER CURE

Sodium salicylate	5 gr.
Phenazoni	2 ,,
Spt. ammonia aromatic	8 drops.
Tr. lemon	5 ,,
Liq. ammonia acetate	1 dr.
Ext. liquorice	q.s.
Water to make	½ oz.

This makes one dose.

WHOOPING COUGH EMBROCATION

Oil caryophylli	4 oz.
Oil succini	4 ,,
Oil camphor	8 ,,

Dose: Embrocate little at a time twice daily.

COUGH ELIXIR

Pulv. tragacanth	2 dr.
Oil anisi	8 mins.
Morphine hydrochloride	12 gr.
Spt. ipecacuanha	3 oz.
Chloroform water	1 dr.
Acid hydrobromic dil.	6 oz.
Glycerine	20 ,,
Rose water	4 ,,
Water to make	80 ,,

Dissolve the oil of anisi in the chloroform, and the morphine salt in 10 oz. of

[illegible] of the ingredients with 10 oz. of glycerin gradually added; dilute with 30 oz. of water and transfer to a porcelain jar. Add the chloroform solution to this and shake, then the morphine and the rest of the ingredients.

Dose: A teaspoonful.

RHEUMATIC MIXTURE

I

Potassium bicarbonate	10	gr.
Sodium salicylate	10	,,
Tin. of colchicum	10	min.
Tr. gentian co.	½	fl. dr.
Cinnamon water to make	1	fl. oz.

II

Solution of ammonium acetate	1	fl. dr.
Potassium iodide	5	gr.
Spirit of sal volatile	20	min.
Lithium citrate	5	gr.
Concentrated infusion of gentian	10	min.
Chloroform water to make	1	fl. oz.

GOUT & RHEUMATISM TABLET

I

Capsicum powder	1	oz.
Quinine salicylate	5	,,
Extract of colchicum, powder	2	,,
Simple syrup		q.s.

Make 4 gr. tablets.

II

Lithium guaiacate	1	oz.
Lithium salicylate	1	,,

ANTI-RHEUMATIC ELIXIR

Quinine sulphate	20	gr.
Acid sulphuric, dil.	½	dr.
Potassium iodide	1	,,
Spt. colchicum	½	oz.
Tr. auranti	2	dr.
Spirit chloroform	2	,,
Water to make	8	oz.

Dose: ½ oz. twice daily.

RHEUMATIC EMBROCATION

Oil cajuput	1	oz.
Chloroform meth.	1	,,
Lin. camph. co. meth.	4	,,
Lin. opii	2	,,
Lin. aconiti meth.	2	,,
Lin. saponis meth.	5	,,

LUMBAGO DROPS

Tr. opii	½	oz.
Oil juniper	½	,,
Spt. nitrous ether	2	,,
Tr. benzoin co.	2	,,
Tr. guaiaci ammon.	8	,,

SCIATICA MIXTURE

Potassium iodide	24	gr.
Sodium salicylate	1½	dr.
Ammonium carbonate	24	gr.
Tr. cimifugae	2	dr.
Tr. gelsemi	1	,,
Chloroform water	4	oz.
Inf. gentian to make	8	,,

Dose: 1 oz.

NEURALGIA MIXTURE

I.

Quinine sulphate	6	gr.
Acid citric	8	,,
Ferri et ammon. cit	40	gr.
Ammonium chlor.	1	dr.
Tr. colchici	1	,,
Tr. hyoscyami	2	,,
Ether chlor.	1	,,
Water to make	6	oz.

Dose: 1 oz.

II

Tr. aconite	6	mins.
Ammonium chloride	2	dr.
Tr. quinine	½	oz.
Tr. gelsemi	½	dr.
Syrup	½	oz.
Chloroform water	3	,,
Water to make	6	,,

Recipes for Small Manufacturers

DENTAL RUBBER CEMENT

Para Rubber	1 part.
Benzine	40 parts.
Chloroform	50 „
Gum mastic	12 „
Gum dammar	4 „

Dissolve the rubber in the solvents. Add the gums and stir until they are completely dissolved.

DRY CLEANING FLUID

Glycol oleate	2 fl. oz.
Carbon tetrachloride	60 „ „
Naphtha	20 „ „
Benzin	18 „ „

Mix. This is an excellent cleaner that will not injure the finest fabrics.

DRY FIRE EXTINGUISHER

Ammonium sulphate	15 oz.
Sodium bicarbonate	9 „
Ammonium phosphate	1 „
Red ochre	2 „
Silex	23 „

Use powdered materials only; mix well and pass through a fine sieve. Pack in tight containers to prevent lumping.

COLOURLESS FRENCH POLISH

White shellac	4 oz.
Sandarac	1 „
Sand	4 „
Methylated spirit	20 „

Powder the resins, mix with the sand, and dissolve in the spirit. Decant the clear portion, and filter the remainder.

MACASSAR HAIR OIL

Sweet almond oil	24 oz.
Alkanet root	1 „
Origanum	1 dr.
Rosemary	1 „
Oil of nutmeg	15 mins.
Oil of neroli	6 mins.
Musk essence	4 „

Take the almond oil in a jar and put into it the alkanet root. Close the mouth of the jar and set aside for two or three days. Then strain. Now mix the other ingredients in the order given in the recipe. Keep the oil for a fortnight when it will be ready for use.

HYDRAULIC BRAKE FLUID FOR AUTOMOBILES

The liquid compressant used in the hydraulic brakes of the modern auto consists of equal parts of denatured alcohol and castor oil. The alcohol thins the oil and acts as an antifreeze. The castor oil lubricates the piston and is the fluid through which the pressure is transmitted.

BLUE-BLACK WRITING INK

Naphthol blue-black	1 oz.
Gum arabic, powdered	½ „
Carbolic acid	¼ „
Water	1 gallon

Stir together in a glass or enamelled vessel until dissolved.

EXTRACT OF MALT WITH VITAMINS

Extract of malt with vitamins in each fluid drachm approximately 3000 units of vitamin A and approximately 225 units of vitamin D. It may be prepared with standardised cod-liver oil concentrate suitably adjusted, if necessary, or by the following process:—

Solution of Vitamin A	70 gr.
Solution of Irradiate Ergosterol	105 „
Groundnut oil	210 „
Vanillin	7 „
Extract of malt to produce	16 oz.

Mix the solutions of vitamin A and irradiated ergosterol and the vanillin with the groundnut oil and rapidly incorporated with the extract of malt in a warm mortar.

It should be stored in coloured bottles.

Dose: 1½ to 1 fl. oz.

ANTI-KINK HAIR CREAM

(Heavy grade yellow) Petrolatum		2 Lbs.	
Beeswax	(av.)	8 oz.	
Venice turpentine		4 oz.	(fl.)
Hot glycerine		9 „	(fl.)
Powdered ammonium chloride	(av.)	1 „	
Powdered potassium nitrate	(av.)	1 „	
Oil of lavender		1 „	(fl.)
Artificial musk	(av.)	3 drachms	

Mix well together the powdered ammonium chloride and potassium nitrate and then add not glycerine (heat over water-bath). To this add ½ of the petrolatum and mix well. To the other half of the petrolatum, add the beeswax and turpentine, using a little heat to melt. Then remove from fire after they are melted and mixed. The first mixture can then the added and mixed to the second mixture. If you wish, perfume can be blended (oil of lavender and artificial musk).

HEADACHE COLOGNE

As a mitigant of headache, cologne water of the farina type is refreshing.

Oil of neroli	6 drachms.
Oil of rosemary	3 drachms.
Oil of bergamot	3 drachms.
Oil of Cedrat	7 drachms.
Oil of orange peel	7 drachms.
Deodorized alcohol	1 gallon

To secure a satisfactory product from the foregoing formula it is necessary to look carefully to the quality of the oils. Oils of [illegible] is [illegible] change, and oil of orange peel, if exposed to the atmosphere for a short time, becomes worthless, and will spoil the other materials.

A delightful combination of the acetic odour with that of cologne water may be had by adding to a pint of the foregoing, 2 drachms of glacial acetic acid. The odour so produced may be more grateful to some invalids than the neroli and lemon bouquet.

Still another striking variation of the cologne odour, suitable for the use indicated, may be made by adding to a pint of cologne water an ounce of ammoniated alcohol.

LIQUID HEADACHE REMEDIES

Acetanilid	60 grains
Alcohol	4 fluidrachms
Ammonium carbonate	30 grains
Water	2 fluidrachms
Simple elixir to make	2 fluidrachms.

Dissolve the acetanilid in the alcohol, the ammonium carbonate in the water, mix each solution with a portion of the simple elixir, and mix the whole together.

HONEY CLARIFIER

For 3,000 parts of fresh honey, take 875 parts of water, 150 parts of washed, dried, and pulverized charcoal, 70 parts of powdered chalk, and the whites of 3 eggs beaten in 90 parts of water. Put the honey and the chalk in a capable of containing ½ more than the mixture and boil for 3 minutes; then introduce the charcoal and stir up the whole. Add the white of the eggs while continuing to stir, and boil again for 3 minutes. Take from the fire, and after allowing the liquid to cool for a quarter of an hour, filter, and to scure a perfectly clear liquid refilter on flannel.

Formulas, Processes & Answers

MANUFACTURE OF ALUMINIUM

393 R.A.M., Bombay—Desires to be enlightened on the process of extracting aluminium from bauxite.

Aluminium does not exist in the free state in nature, but in combination with oxygen and silicon. Aluminium is extracted from bauxite.

Bauxite is finely ground and heated in a reverberatory furnace with soda ash, by which means sodium aluminate is formed. The cool fused mass is extracted with water, and treated with sufficient hydrochloric acid to combine with the sodium the aluminium then separates the hydrate. This is made into a paste with a mixture of common salt and charcoal, moulded into balls and then thoroughly dried, after which the mixture is heated in cylinders through which dry chlorine is passed. Under this treatment a double chloride of sodium and aluminium distils over and condenses in the solid form. This salt is mixed with sodium in the proportion of ten parts to two; five parts of cryolite or fluorspar are added to form a slag over the surface of the metal. The whole mixture is thrown on to the heart of a reverberatory furnace, when a most violent reaction occurs between the sodium and the double chloride resulting in the following change:—

Sodium aluminium chloride + Sodium = Sodium chloride + aluminium.

The melted aluminium collects beneath the slag.

FIRE EXTINGUISHERS

297 R.L.D., Bombay—Wants formulas of Fire extinguishers, Fireproof paper, Fish bait etc.

Iron sulphate	16 parts.
Ammonium sulphate	16 „
Water	100 „

Mix, dissolve, and fill into flasks.

Fireproofing For Tents.

	Parts by weight
Water	100 „
Ammonium sulphate, chemically pure	14 „
Boracic acid	1 „
Hartshorn salt	1 „
Borax	3 „
Glue water	2 „

Boil the water, put ammonium sulphate into a vat, pour a part of the boiling water on and then add the remaining materials in rotation. Next follow the rest of the hot water. The vat should be kept covered until the solution is complete.

FIREPROOF PAPER

Paper is rendered fireproof by saturating it with a solution of :

Ammonium sulphate	8 parts
Boracic acid	3 „
Borax	2 „
Water	100 „

For the same purpose sodium tungstate may also be employed.

FISH BAIT

Oil of rhodium	3 parts
Oil of cumin	2 „
Tincture of musk	1 part

Mix. Put a drop or two on the bait, or rub trigger of trap with the solution.

[illegible]

Hard paraffin	1 pound.
Powdered boric acid	7 pounds
Oil Levender	1 drachm
Oil neroli	20 minims

Melt the paraffine and add the boric acid and the perfumes. Mix well, and sift through a 1/16 mesh sieve.

RENOVATING OLD PARQUET FLOORS

A good formula for renovating old parquet floors is prepared as follows:—

Benzol	4 pints.
Amyl acetate	3 „
Carbon tetrachloride	1 pint.

Apply this mixture to the wooden floor and allow to stand for a few minutes or until the old coating has been softened. Then scrape the floor clean with putty knife or with steel wool. Clean thoroughly and when dry, wax or varnish as desired.

When using the above mixture caution should be exercised not to have any open flames in the vicinity and also to have good ventilation as the vapours given off are toxic and inflammable.

FLY PAPERS

332 C.R.D.M., Jabalpure—Wants formulas of Fly Papers, Fly Poison, etc.

Boiled linseed oil	5 to 7 parts.
Gum thus	2 to 3 „
Non-drying oil	3 to 7 „

For the non-drying oil, cotton-seed, castor or neatsfoot will answer—in fact, any of the cheaper oils that do not readily dry or harden will answer. The proper amount of each ingredient depends upon the condition of the boiled oil. If it is boiled down very stiff, more of the other ingredients will be necessary, while if thin less will be required.

FLY POISON

Pepper	4 ounces.
Sugar	[illegible]
Dilute alcohol	[illegible]

Mix dry and sprinkle around where the flies can get it.

ANTI-FREEZING, NON-CORROSIVE SOLUTION

A solution for water-jackets of gas engines that will not freeze at any temperature above 20° below zero (F.) may be made by combining 100 parts of water, by weight, with 75 parts of carbonate of potash and 50 parts of glycerine. This solution is non-corrosive and will remain perfectly liquid at all temperatures above its congealing point.

ANTI-FROST SOLUTION

As an excellent remedy against the freezing of shop windows, apply a mixture consisting of 55 parts of glycerine dissolved in 1,000 parts of 62 per cent alcohol, containing, to improve the odour, some oil of amber. As soon as the mixture clarifies, it is rubbed over the inner surface of the glass. This treatment, it is claimed, not only prevents the formation of frost, but also stops sweating.

FUMIGATING PERFUMES

These are used for quickly putting down bad odours in the sick room, etc. They are decidedly antiseptic, and fulfil their purpose admirably.

I.

Select good white blotting paper, and cut each large sheet lengthwise into 3 equal pieces. Make a solution of 1 ounce of potassium nitrate in 12 ounces of boiling water; place this solution in a large plate, and draw each strip of paper over the solution so as to saturate it. Then dry by hanging up. The dried paper is to be saturated in a similar manner with either of the following solutions:

(1)	Siam benzoin	1 ounce.
	Storax	3 drachms
	Olibanum	2 scruples.
	Mastic	2 „
	Cascarilla	2 drachms
	Vanilla	1 drachm
	Rectified spirit	8 ounces

Bruise the solids and macerate in the spirit 5 days, and add:

Oil of cinnamon	8 parts
Oil of cloves	8 „
Oil of bergamot	5 „
Oil of neroli	5 „

Mix.

(2)	Benzoin	1½ ounces
	Sandal wood	1 ounce
	Spirit	8 ounces

Macerate as No. 1, and

add Essence of vetivert	3 ounces
Oil of lemon grass	40 drops

Mix.

After the paper is dry, cut up into suitable sized pieces to go into commercial envelopes.

II.

Benzoin	1 av. ounce
Storax	1 „ „
Fumigating essence	2 fluidounces
Ether	1 fluidounce
Acetic acid, glacial	20 drops
Alcohol	2 fluidounces

Dissolve the benzoin and storax in a mixture of the alcohol and ether, filter and add the fumigating and the acetic acid. Spread the mixture upon filtering or bibulous paper and allow it to dry. To prevent sticking, dust the surface with talcum and preserve in wax paper. When used the paper is simply warmed, or held over a lamp.

III.

Musk	0.2 parts
Oil of rose	1 part
Benzoin	100 parts
Myrrh	100 „
Orris root	2560 „
Alcohol (90 per cent)	500 „

IV.

Benzoin	80 parts
Balsam Tolu	20 „
Storax	20 „
Sandal wood	20 „
Myrrh	10 „
Cascarilla bark	20 „
Musk	0.2 „
Alcohol	250 „

PINE-TAR DANDRUFF SHAMPOO

Pine tar	4 parts
Linseed oil	40 „

Heat these to 140°F.; make solution of potassa, U.S.P., 10 parts, and water, 45 parts; add alcohol, 5 parts, and gradually add to the heated oils, stirring constantly. Continue the heat until saponified thoroughly; and make up with water to 128 parts. When almost cool, add ol. lavender, ol. orange, and ol. bergamot, of each 2 parts.

HAIR CURLING LIQUIDS

197 P.K.R., Burdwan — Wants formulas of Hair curling liquid, dressings for hair, hair restorer, etc

It is impossible to render straight hair curly without the aid of the iron or paper and other curlers. But it is possible on the other hand, to make artificial curls more durable and proof against outside influences, such as especially dampness of the air. Below are trustworthy recipes:

	I.	II.
Water	70	80
Spirit of wine	30	20
Borax	2	-
Tincture of benzoin	-	3
Perfume	q.s.	

DRESSINGS FOR THE HAIR

Oil of wintergreen	20 drops.
Oil of almond, essential	25 „
Oil of rose, ethereal	1 [illegible]

Oil of violets	30 drops	
Tincture of cantharides	50	„
Almond oil	2,000	„

Mix

HAIR EMBROCATION

Almond oil, sweet	280	parts
Spirit of sal ammoniac	280	„
Spirit of rosemary	840	„
Honey water	240	„

Mix. Rub the scalp with it every morning by means of a sponge.

HAIR RESTORER

Tincture of cantharides	7	parts
Gall tincture	7	„
Musk essence	1	part
Carmine	0.5	„
Rectified spirit of wine	28	parts
Rose water	140	„

To be used at night.

ROSEMARY WATER

Rosemary oil	1½	parts.
Rectified spirit of wine	7	„
Magnesia	7	„
Distilled water	1,000	„

Mix the oil with the spirit of wine and rub up with the magnesia in a mortar; gradually add the water and finally filter.

LANOLIN HAIR WASH

Extract 4 parts quillaia bark with 96 parts water for several days, mix the percolate with 4 parts alcohol, and filter after having settled. Agitate 40 parts of the filtrate at a temperature at which wool grease becomes liquid, with 12 parts anhydrous lanolin, and fill up with water to which 15 per cent spirit of wine has been added, to 300 parts. Admixture, such as cinchona extract, Peru balsam, quinine, tincture of cantharides, bay oil, ammonium carbonate, menthol, *etc.*, may be made. The result is a yellowish-white, milky liquid, with a crea[illegible] floating on the top, which is finely distributed by agitating.

BIRCH WATER

Birch water, which has many cosmetic applications, especially as a hair wash or an ingredient in hair washes, may be prepared as follows:

Alcohol, 96 p.c.	3,500	parts
Water	700	„
Potash soap	200	parts
Glycerine	150	„
Oil of birch buds	50	„
Essence of spring flowers	100	„

Cholorophyll, q.s. to colour.

Mix the water with 700 parts of the alcohol, and in the mixture dissolve the soap. Add the essence of spring flowers and birch oil to the remainder of the alcohol, mix well, and to the mixture add, little by little, and with constant agitation, the soap mixture. Finally add the glycerine, mix thoroughly, and set aside for 8 days, filter and colour the filtrate with chlorophyll, to which add a little tincture of saffron. To use, add an equal volume of water to produce a lather.

A CHEAP HAIR OIL

218 B.R.C., Allahabad.—Desires to be enlightened on cheap hair oil preparation.

I.

Sesame oil or sunflower oil	1,000	parts;
Levender oil	15	„
Bergamot oil	10	„
Geranium oil	5	„

II.

Sesame oil or sunflower oil	1,000	parts:
Levender oil	12	„
Lemon oil	20	„
Rosemary oil	5	„
Geranium oil	[illegible]	„

FOR FALLING HAIR

I

Hydrochloric Acid	75 parts.
Alcohol	2,250 „

The lotion is to be applied to the scalp every evening at bedtime.

II

Tincture of cinchona	1 part
Tinnture of rosemary	1 „
Tincture of jaborandi	1 „
Castor oil	2 parts
Rum	10 „

Mix.

DEPILATORY CAKE

Barium sulphide	16 parts
Zinc oxide	40 „
White vaseline	12 „

First pass the zinc oxide through a fine siev. There should be no clods in it. Now add barium sulphide in its dry condition and stir thoroughly. Again mix the vaseline with it and knead it thoroughly. Now mould into cakes of suitable site.

WHITE SHOE CREAM

198 O.K.C.T.W., Bangalore Cantt. —Wants formulas for preparing white shoe cream and floor polish.

White ceresine wax	10 parts
Aluminium stearate	15 „
White wax	20 „

Melt the ingredients together in an enamelled vessel and add enough blue to give the required whiteness. Then add 80 parts of turpentine and 40 parts tetraline extra and mix thoroughly. Lastly allow the mixture to cool and pour in bottles.

POTASSIUM CHLORATE TOOTH POWDER

493 D.D., Lahore — Wishes to have formulas of preparing tooth powder.

Precipitated chalk	10 oz.
Potassium chlorate	1½ oz.
Borax powder	1 oz.
Saccharine	5 grains
Oil of wintergreen	20 mins.
Oil of peppermint	20 „

Mix the chalk, chlorate and borax in fine powder. Then add the saccharine. After this mix the oils and pass the mixture several times through a sieve to ensure thorough mixing.

SCENTING VERMILION

259 R.A.M.S. Madhubani—Wants to know a process of scenting vermillion.

To incorporate scent, take a small quantity of vermilion in a stone or porcelain mortar and add to it a few drops of essential oil, such as oil of rose, oil of jasmine or oil of lavender. Triturate for some time and then mix this scented powder to a large quantity of vermilion and pass through fine sieves for several times. Finally pack in well stoppered bottles.

PERFUMED BETELNUTS

283 J.K.L., Lahore—Wishes to have a formula of preparing perfumed betelnuts.

To prepare perfumed betelnuts, take betelnut chips and then mix it with a small quantity of glycerine. Next put some harmless pink colour like ammoniated carmine solution and finally perfume with menthol, eucalyptus oil, camphor, etc., the portions of which may be determined by a couple of trials.

BELL METAL

379 M.T.W., Pattambi — Wants to have a recipe of bell metal.

Bell metal is an alloy of copper and tin. To prepare it fuse in a fire clay crucible a mixture composed of copper 4 parts and tin 1 part using a little borax as flux.

Reader's Business Problems

[Reader's business problems will be discussed in these pages. We invite the reader to write us his difficulties. As the department is in charge of an experienced businessman who is specially adept in dealing with such problems and to whom experiences of a large number of successful businessmen are available, his replies will lead the enquirer to a successful career. These replies will be published in the paper only and cannot be communicated by post.]

A GOLDSMITH'S BUSINESS.

98 J.N.C., Banaras.—A goldsmith by caste as well as by profession has been persistently telling me for some time that by investing the sum of Rupees ten thousand in the business under his direction, a portion of which is to be set apart for the purchase and sale of old ornaments and jewellery, I might easily earn the sum of Rs. 500 every month, after defraying all expenses. I may also tell you that I am utterly without any experience in the matter, but at the same time, have no reason to disbelieve the goldsmith, who is an old neighbour and very well-known to me and my family. Should I act wisely in following his advice?

ANSWER :—We thank you for quite candidly telling us that you are "utterly without any experience in the matter". You could, perhaps, have made matters easier for us by stating if the goldsmith in question, who wants you to invest Rs. 10,000 "under his direction", is out of work or if he wants to improve his present business by having you as a partner in the business. We have certainly no right to contradict you, when you say that you have no reason to disbelieve your old neighbour, as we have neither seen him nor known him. But you must yourself admit that it is one thing to "have no reason to disbelieve" an individual, and quite a different thing to "have every reason to believe him". As you have not stated that in your query, we might, without any violent stretch of the imagination, take it that your neighbour was never, at least to your knowledge, placed in situation in which his honesty and and virtue were tested, and out of which he emerged triumphant. Why, we can say of almost every man we meet on the road that we "have no reason to disbelieve him". People have been known to cut their neighbours' throast for far lesser sums than Rs. 10,000 and your negative testimony, we must say, leaves us unconvinced. Unless you were thoroughly experienced, how could you possibly exercise any supervision worked efficiently and honestly? And then again this "buying and selling of old jewellery" often leads one to shady transactions if one lacks the requisite experience. We do not often generalise, but you must not mind our telling you that goldsmiths are a very wily class, and you would act wisely in keeping your money in your bank until you acquired the necessary amount of experience in order to be able to earn Rs. 500 per month by investing it in the manner proposed by your neighbour.

Queries and Replies

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of Rs. 1 stamps for each question. Subscribers outside India are requested to send eight International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

415 F.I.F., Agra—Following is a formula of handkerchief perfume: Rectified spirit 24 oz.; Extract rose or istambal 30 minim.; Otto de rose (virgin) 20 minims.; Heiko white rose 1 dr.; Otto keora 15 minims.; Otto orange flower 10 minims; Essence chameli 1 oz.; Essence jasmine 1 oz.; Essence tuberose 1 oz.; Essence ambergris 1 oz. Into the rectified spirit add the ingredients one by one and shake well for 5 minutes after each such addition. Finally keep the whole in a stoppered bottle and shake thrice daily, 10 minutes at a time, for seven days together. Finally filter and phial. The preparation is quite a novel invention.

416 P.K., Ludhiana—For selling bone you may negotiate with the following bone mills: Balikhal Bone Mills, 9, Theatre Road, Calcutta; Bengal Bone Mills, 3 & 5, Ran Mohan Mullick's Garden Lane, Calcutta and Ganges Valley Bone Mills, Uttarparah, Hooghly

417 R.N.D., Mymensingh—Chemicals you require may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta. Dyes may be had of Fuzle Hussein & Bros., 44, Armenian Street and Champalal Agarwala, 45, Armenian Street; both of Calcutta. Waxes of all kinds may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

418 H.U.R., Jabalpur — Particulars of defertilisation plant are not available. Sodium silicate is known as water glass. You should dissolve water glass in equal quantity of boiling water. Eggs to be preserved should be dipped in the water glass solution and packed when thoroughly dried.

419 B.S., Bombay—Following is a formula of vinegar: Molasses 1 gallon; Acetic acid 4 lbs. Put the ingredients together into a cask of 40 gallons capacity. Fill it with rain water or distilled water; shake it up and let it stand from one to three weeks and the result is good vinegar.

420 F.L.L.S., Calcutta—Following is a list of electroplaters: Economic Electro Plating Works, 50, Free School Street; Electro Nickel & Chromium Works, 2E, Kartic Bose Lane; Electro Technical Works, 8, Shanti Ghose Street; Oriental Engineering Works, 40A-v, Strand Road; Sen Gupta Electroplating Works, 84, Dharmtalah Street and Standard Electroplating Works, 115-A-B, Dhurramitola Street; all of Calcutta.

421 M.W.P., Bombay—Following is a formula of artificial marble: Alum 1000 parts; Heavy spar 10 to 100 parts; Water 100 parts; the amount of heavy spar being governed by the degree of translucence desired. The alum is dissolved in water with the use of heat. As soon as the solution boils the heavy spar is mixed in, stirred with water and the pigment; this is then boiled down until the mixture has lost about 3 per cent of its weight, at which moment the mass exhibits a density of 34°Be at a temperature of 212°F. The mixture is the substance semi-liquid. The resultant mass is poured in a mould covered on the inside with several layers of collodion and the cast permitted to cool completely in the mould, whereupon it is taken out and dried entirely in an airy room. Subsequently the object may be polished patenized, or finished, in some other ways.

422 M.R.S., Burdwan—Following is a list of cloth merchants: Bengal Swadeshi Stores Ltd., 16, Pageyapatty, Bara Bazar; Ramdeo Laxmi Narayan, 17, Pageyapatty, Bara Bazar; Ramkanai Jaminiranjan Paul, 213, Harrison Road; Sashi Bhusan Maity, 103, Harrison Road; Shyam Sundar Narayan Prasad, 20A, Harrison Road; Kamalalaya Stores Ltd. 156A, Dharamtala Street and L. Baijnath & Co., 213, Harrison Road; all of Calcutta.

423 N.V., Bombay—Following is a list of beeswax dealers: Bhagwandas Sud & Sons, Bhagwandas Road, Hoshiarpur; Calcutta Traders, 31, Ramkrishna Samadhi Road, Manicktala, Calcutta-11; Calcutta Wax Traders & Co. Ltd., 24, Strand Road, Calcutta-7 and Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

[illegible] issue of Industry. An article on the manufacture of toilet preparation will be found in the same issue.

425 C.U.B., Madras—Following is a process of making ink tablets: In making ink tablets take the following composition in a mortar and moisten it with as little water as possible. Do not add too much water which will take a long time to dry. Now put this moist lump over a tray and expose it to dry in the sun for three or four hours. When dry break the lump into coarse powder so as to form granules like mustard. Now compress into tablets in a tablet making machine. Methylene blue 8 oz.; Methyl violet 2 oz.; Sugar powdered 2 oz.; Dextrine 1 oz.; Boric acid 2 dr.

426 V.C.T.W., Madras—Labels separate from tin because the paste becomes too dry. Some moisture is presumably always possessed but more is required to cause continued adhesion in the case of tin than where the container is of glass. Paste may be kept moist by the addition of calcium chloride, which is strongly hydroscopic, or of glycerine. The following is a formula of paste of the above type: Tragacanth 1 oz.; Acacia 4 oz.; Thymol 14 grains; Glycerine 4 oz.; Water sufficient to melt 2 pints. Dissolve the gums in 1 pint of water, strain and add the glycerine, in which the thymol is suspended; shake well and add sufficient water to make 2 pints.

427 V.T., Bangalore—For selling cloths you may negotiate with the following firms: Kamalalaya Stores Limited, 156A, Dharamtala Street; Haralalkha & Co., 52-1-1, College Street; Bengal Stores Ltd., 8A, Chowringhee Place; Wachel Molla & Sons, 6, Dharamtala Street; Ramkanai Jaminiranjan Paul, 213, Harrison Road and East Bengal Society, 87-2, College Street; all of Calcutta.

428 V.B., Tumsar—Process of manufacturing all kinds of soap will be found in Manufacture of Soap published from this office, price Rs. 4/12/- including postage.

429 R.K.D., Jabalpur—Following is a list of coal merchants: Amritalal Ojha & Co., 103/A, Netaji Subhas Road; Bajpas Banerji & Co., 2, Commercial Bldgs., 23 Netajee Subhas Road; Bengal Coal Co. Ltd., 8 Clive Row; [illegible] Collieries Ltd., 9, Dalhousie Square [illegible]; Gillanders Arbuthnot & Co., Netaji

430 S.M.S.T.F., [illegible] nufactured from tapioca and [illegible]. Globule making machine is required [illegible] manufacturing sago. Process of manufac[illegible]turing sago will be found in June, 1954 [illegible] of Industry.

431 T.C.I., Delhi—To colour [illegible] red the article is placed for 24 hours [illegible] water, 1,000 parts of which carry 100 parts of vinegar (acetic acid, 6 per cent), and [illegible] to 5 parts of aniline red. As soon as [illegible] acquires the desired colour pour off the liquid, let the ivory dry, and polish with Vienna lime.

432 P.K.G., Panagar—To prepare DDT solution take DDT 10 parts and put it in carbon tetrachloride 90 parts. Shake for a few minutes and then keep aside for a few days. Following is a formula of ink erasing powder: Alum 1 part; amber 1 part; sulphur 1 part; saltpetre 1 part. Mix well together and keep in a glass bottle. If a little of this powder is placed on an ink spot or fresh writing rubbing very lightly with a clean linen rag the writing will disappear at once. Following is a formula of furniture varnish: Shellac 4 oz.; sandarac 1 oz.; methylated spirit 20 oz. Powder the resins, mix with the sand and dissolve in the spirit. Decant the clear portion and filter the remainder. Now dissolve a small quantity of spirit soluble mahogany [illegible] methylated spirit and mix them in the above varnish.

433 B.R.S.L., Howrah—Following is a list of fireworks manufacturers: Baba Fire Works, Surat; Bonbonniere, P.O. Box [illegible], Calcutta; Dipali Fire Works, Konnagar, Hooghly; Kaka Fire Works Factory, [illegible] Road, Andheri, Bombay; Orient Fire Works Co., 175-B, Upper Circular Road, Calcutta-[illegible]; Victory Fire Works Industries, High Road, Trichur, Travancore-Cochin; Wishnu Brand Fire Works and Allied Chemicals Factory, [illegible], Fifth Main Road, Chamarajpet, Bangalore City and Calcutta Fire Works Co., 28, [illegible]danga Road, Baranagore, Calcutta.

434 D.C., Jammu—You may communicate with the following firms: Birla Bros. Ltd., Imperial Bank Bldgs., Bank Street, Fort, Bombay; Capitti Traders, 77-87, Mirchi Street, Vadgadi, Bombay; H.R. Brijlal & Co., [illegible] Beauman Chambers, Medows Street, Fort, Bombay-1; Bajoria Agency Ltd., 3-B, [illegible] Place, Calcutta-1; Bombay Company [illegible]

"Pollock House", 184, [illegible] Road, Calcutta-1; Dawn & Co., 11, Portuguese Church Street, Calcutta-1; Grahams Trading Co. (India) Ltd., 6, Lyons Range, Calcutta-1 and Oriental Trading Co. Ltd., 71-A, Netaji Subhas Road, Calcutta.

435 B.K.R., Madras—Following is a process of making scented betelnut chips: Pulverise several betelnuts. Then mix with sufficient quantity of glycerine so as to moisten the powder. Next add a little pink colour, which should of course, be harmless. Lastly add a small amount of menthol, eucalyptus oil etc. to perfume the substance as delicately as possible.

436 C.R.D., Burnpur—Chemicals may be had of Butto Kristo Paul & Co. Ltd., 1 & 3 Bonfield Lane; Calcutta Chemical Co. Ltd., 10, Bonfield Lane and Allied Agency, 16, Bonfield Lane; all of Calcutta. Dyes may be had of Fazle Hussein & Bros., 44, Armenian Street and Champalal Agarwalla 45, Armenian Street, both of Calcutta. Waxes and indigenous herbs may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

437 D.B., Jodhpur—Process of manufacturing milk powder will be found in Milk and Milk Products published from this office, price Rs. 4/12/- including postage. We have no book dealing with the manufacture of pharmaceutical products. For analysis of milk powder you may write to B.V. Briggs & Co., 3 & 4, Garstin Place, Calcutta and Govt. Test House Alipur, Calcutta.

438 Y.I.F., Calcutta—Following is a formula of liquid gum: Gum arabic 20 lbs.; water 5 gals.; glycerine 7 lbs.; perfume 4 oz.; formalin 2 oz. Simmer the gum in the water until dissolved. Add the glycerine towards the end stirring it well. Then cool and stir formalin. Following is a recipe of tooth powder: Magnesium peroxide 10 parts; hard soap powdered 2½ parts; menthol 1/10 part; oil of rose ¼ part; oil of wintergreen ¼ part heavy chalk powder 900 parts. Mix and sift three times.

439 H.M.B., Jharia—Cooker may be had of In-Mic Cookers Ltd., 211-1A, Bow Bazar Street; Industry Cooker Company, 70, Shova Bazar Street; Bharat Cooker Co., 30-A, College Street; Mohan Cooker, 33, College Street; Mahantho Cooker & Co., 23, College Street and Keshab & Sons, 38-2, Girish Mukherjee Road; all of Calcutta.

440 B.D.R.S., Amritsar—Following is a formula of Ultramarine blue: Chinaclay 100 parts by weight; sulphate of soda [illegible] parts by weight; carbonae of soda 41 parts by weight; carbon 17 parts by weight; sulphur [illegible] parts by weight; sulphite of soda 26 parts by weight. Take the ingredients free from iron and grind fine. Next heat in a muffle furnace in closed pots. This produces white ultramarine and turns green on exposure to air for some time. The latter is mixed with 4 per cent sulphur and roasted in shallow pans, must be well stirred. Following is a formula of Chinese blue: Sulphate of iron 63 parts; Yellow prussiat of potash 56 parts; sulphuric acid (cons) 30 parts; bicarbonate of potash 8 parts. Dissolve the sulphate of iron in 100 gallons of boiling water and also dissolve in a separate vessel the prussiate of potash in an equal quantity of boiling water. Mix the two solutions add boil for 1½ hours. Now pour very slowly the acid and then add the crystals of bicarbonate of potash. Stir very gently for ten minutes wash at once and repeat washing at least three times; filter, press and dry.

441 B.D., Banaras—Following is a list of weaving establishments of South India: Ashok Weaving Works, Chovva, N. Malabar; Balkrishna Weaving Co., Cannanore, Malabar; C. Aoran & Sons, Pappiniseri, Malabar; C.V.V. Venkatarama Chettiar, Coimbatore; Chandra Sekara Bharathi Weaving Mills, Rajapalaiyam, Ramnad, Coimbatore Weaving Syndicate, Coimbatore; Jayalaxmi Power Factory, Mysore City and Kerala Weaving Factory, Chovva, Cannanore, Malabar.

442 K.B.C., Madras—Following is a recipe of razor hone paste: Fine carborundum powder 6 lbs.; beef suet (freshly rendered) 2 lbs.; beeswax yellow 1 lb.; Melt the suet and the wax then incorporate carborundum powder, cool and cut into small cubes or put in tin containers.

443 F.I.R., Madras—Following is a list of groundnut dealers: All India Groundnut Syndicate Ltd., 16, Apollo Street, Fort, Bombay; Kenji Devji Bros., Musjid Bunder Road, Bombay; H. Ratilal & Co., Post Box 5012, Bombay; Louis Dreyfus & Co. Ltd., 98, Armenian Street, Madras; Senairam Ram Kumar, 222, Chittaranjan Avenue, Calcutta; Hossain Kasam Dada, Post Box 695, Calcutta and P. Mochi Trading Company, Ansari Street, Pollachi.

446 P.N.B., Mehsana—We have no book dealing with the manufacture of sunproof distemper.

process of making wooden slates into a fine powder, lift the powder and rub it with water upon a stone. When dry rub it again with the muller and then add to 5 parts of the slate powder ½ part of lamp black: mix thoroughly with a strong solution of sodium silicate and boil the whole over a moderate fire. Then apply a thin and uniform layer of the composition to smooth wooden planks of required size, let them dry and repeat the process until the coat has the proper thickness. Keep these aside for a fortnight and then pumice them and finally apply a coat of infusion of gall nuts.

449 V.C.C., Calcutta—Boot polishes are manufactured by Bata Shoe Co. Ltd., Bata Nagar, 24 Parganas; House of Committee, 176, Rash Behari Avenue, Calcutta-19 and J. P. Industries, 174, Chittaranjan Avenue, Calcutta.

451 T.G.I., Tirruhirapalli—Process of manufacturing printing roller composition will appear in an early issue of Industry. Formalin is mainly used as a preservative. Linseed oil is used as a drying agent. Potassium or sodium dichromate may be used for hardening glue.

454 R.B.S., Aligarh—Ferric chloride may be obtained in anhydrous condition by passing excess of chlorine gas over red hot iron. In solution it may be prepared by dissolving the precipitated sesquioxide by hydrochloric acid and driving of the excess of acid by heat, or preferably by dissolving iron in hydrochloric acid and passing chlorine through the liquid until saturated with that gas, finally entirely removing the chlorine by passage of current of carbon dioxide through the warm liquid.

457 D.K. Bhopal—Collapsible tubes may be had of Metal Box Co., of India Ltd., 41, Chowringhee Road, Calcutta.

458 V.V.N., Travancore—There is no arrangement for giving training on glue manufacture. You may however negotiate with India Glue Works, 11, New Tangra Road, Calcutta.

Utility Combine. You may however enquire of the following firms for your requirements: Alfred Herbert (India) Ltd., 13/3 Strand Road; Associated British Machine Tool Makers Ltd., Alexander & Raymond, 46, Stephen House, Dalhousie Square; National General Engineering 19, Strand Road and Stores Supply Syndicate, 20, Strand Road; all of Calcutta.

460 B.D.A., Gorakhpur—Before purchasing the machine you should see the working of the machine. In the meantime you may negotiate with the following firms: The Corporated Engineers (India) Ltd., 7, Chittaranjan Avenue, Calcutta-13; Shibpore Eng. and Foundry Works, 120, Harrison Road, Calcutta and Indo Engineering Corporation, 62, Netaji Subhas Road, Calcutta.

462 R.L.B., Calcutta—Furnaces may be had of Bagshawe & Co. (India) Ltd., Strand Road; Balmer Lawrie & Co. Ltd., 21, Netaji Subhas Road; Chowgule & Co. (Hind) Ltd., 7, Chittaranjan Avenue; Jessop & Co. Ltd., 93, Netaji Subhas Road and William Jacks, 30 Netaji Subhas Road; all of Calcutta.

465 F.I.R., Bombay—Following is a formula of polishing powder for gold: Carbonate of lead 21½ parts; chalk powder 37 parts; carbonate of manganese 8½ parts; alumina 21½ parts; silica 13 parts; jeweller's rouge 8½ parts.

467 M. L. B., Delhi—For industrial thermometer enquire of K. R. Lynch & Co., 113, Chittaranjan Avenue; Scientific Instrument Co. Ltd., 11, Esplanade East and Scientific Supplies (Bengal) Company, C-37, 38, College Street Market; all of Calcutta.

469 I.M.M., Asansol—Ice making machines may be had of Air Conditioning Corporation Ltd., 8, Netaji Subhas Road; Corporated Engineers (India) Ltd., 7, Chittaranjan Avenue; M. S. Vernal & Co., Bharat Insurance Bldgs., Chittaranjan Avenue South and Sulzer Bros. Ltd., Netaji Subhas Road; all of Calcutta.

Review OF BOOKS

[illegible] DESIGNS FOR LOW-COST HOUSES. Issued and Published by The Concrete Association of India, Bombay Mutual Building, Calcutta-1.

Here is a copiously illustrated brochure meant to arouse, in its own language, 'wide public interest in largescale low-cost housing.' Dealing with the problem of national housing it says that the future housing, instead of imitating the past, must be planned to fulfil all the requirments of the people and give concrete expression of the racial and technical conditions of our age and generation in clear and simple forms. This task is not an easy one to perform and the attempt to hurry it through, might not solve the problem at all. As the brochure puts it, "we must plan logically for fresh air, space, quietness and orderliness" The brochure deals with the problem of construction in both dry and wet zones. The chief problem in the dry zone is the prevention of transference of heat through the walls, roof and openings, by proper insulation and ventilation. In the wet zone where climate is warm and moist at the same time, large windows and openings are desirable to allow free movement of air but these have to be judiciously protected from the monsoon by adequate chajjas.

MACHINES FOR COTTAGE INDUSTRY. Supervised by Ministry of International Trade & Industry, Japan. Published by Japan Export Trade Research Organisation. Supported by Japan Machinery Exporters Association. Representative in India: J. L. Shah, Japan External Trade Recovery Organisation (Jetro), Post Box [illegible], Calcutta-1.

This well-illustrated brochure gives a useful picture of Japan's machinery industry and trade and the directory with which it is rounded off gives the names and addresses of machinery manufacturers and exporters. To the layman with no very dependable knowledge of thing obtaining in Japan, this catalogue will go down as a revelation giving rise to a feeling of wonder how a country which had come out of the throes of a devastating war a short while ago, could manage to cover such wide lengths of the path to rehabilitation. It is a complete photographic delineation of the present set-up in Japan's agricultural cum rural industrial machinery industry.

A glance at the contents of this publication is enough to convince all and sundry that Japan's small machinery industry has already been placed on a firm footing. At present Japan can offer the following types of machines and plants:—

(1) Commodity goods manufacturing machines.
(2) Paper goods manufacturing machines.
(3) Printing Presses.
(4) Wood and bamboo processing machines.
(50 Textile goods manufacturing machines.
(6) Agricultural implements and tools.
(7) Food processing machines.
(8) Miscellaneous other types such as, tabletting machines, bottle making machines, washing machines, freezer and ice making machines, small electric motors, etc.

Commenting on the role of medium and small industries in Japan's economy, this publication points out that as much as 91 p. c. of her enterprises are small and medium ones respectively employing less than 100 workers and as much as 61 p. c. of her entire workers are on the pay-rolls of these enterprises and as much as 37 p. c. of her manufacturers are produced by them. The following extract from the brochure reveals to what extent Japan has succeeded in mechanising her small and medium enterprises:—

"Most industries engaged in the production of daily commodities and textiles have been mechaulzed and even printing industry on a small or medium scale is using offset machines. In the field of metal and machinery industry, the production of nails, wires, screws, etc., is resorting to various automatic machines, the processing of farm products -------- and the handicraft -------- have been completely mechanized."

It is claimed that the machines concerned possess the following merits: (1) they are simple to operate; (2) they are strong and durable; and (3) they are low priced.

The following information is published for the guidance of parties intending to quote in respect of tenders, issued by the Director General, Supplies and Disposals, New Delhi and his Regional Offices at Calcutta, Bombay and Madras.

1. Tenders should reach the office issuing the tender notice by the time and date specified therein.

2. Tender forms can be obtained from the Office of the Director General, Supplies and Disposals, Shahjahan Road, New Delhi, or from Regional Offices at Calcutta, Bombay and Madras, in case of tender notices issued by the Headquarters. Where the tender notice has been issued by a Regional Office tender forms should be obtained from the office issuing it.

3. Tender forms will be issued on prepayment of the fees prescribed, which may be paid in cash, by Money Order or Indian Postal Order, quoting tender number, name and full address of the remitter.

4 Tender fees paid are not refundable; nor are the tenders transferable.

5. Tenderers, not on the approved list of contractors, maintained by the Directorate General of Supplies and Disposals must give the name of their Bankers and submit along with tenders an Income Tax Clearance Certificate duly countersigned by the Income-tax Officer of the circle concerned under seal of his office.

SUPPLY OF SHOVELS STOKING

Office of Issue:— The Directorate General of Supplies and Disposals (Railway Stores Directorate), New Delhi.

Tender No.—P/SW-3/19602-E/IV.

Due by 10 a.m. on the 30th November 1954.

Sealed tenders are invited for—

Item No.	Description of Stores.	Quantity.
1.	Shovels Stoking with 27" long T. handle, to I. S. I. Specn. No. 274-1951	7,164 Nos.
	Price per tender set	Rs. 4.

SUPPLY OF BOILER TUBES, STEEL.

Office of Issue:— The Directorate General of Supplies and Disposals, Shahjahan Road, New Delhi.

Tender No.—P/SW-3/[illegible]

Due by 10 a.m. on the [illegible] November [illegible]

Sealed tenders are invited for—

Description of Stores.	Quan[illegible]
Boiler Tubes, Steel	1,[illegible]
Price per tender set	Rs. [illegible]
Price of drawing	Rs. [illegible]

SUPPLY OF TELEPRINTER, PAGE PRIN[illegible] ETC.

Office of Issue:— The Directorate Ge[illegible] of Supplies and Disposals, Shahjahan R[illegible] New Delhi.

Tender No.—P/SE-3/1800-E/III.

Due by 10 a.m. on the 21st December [illegible]

Sealed tenders are invited for—

Item No.	Description of Stores.	Quan[illegible]
1.	Tape Type Teleprinter	1[illegible]
2.	Page Printers with Key Board	2
3.	Tape Type Teleprinter Receiving only for incoming messages with attached Reperforator	10
4.	Printing and Perforating Tape Type Teleprinter	[illegible]
5.	Spare Parts for above Machines	Se[illegible]
6.	Electrone Start Stop Distortion Meter	1
7.	Cathode-ray Relay Tester	1
	Price per tender set	Rs. [illegible]

SUPPLY OF RAILWAY SIGNALLING CA[illegible]

Office of Issue:— The Directorate Ge[illegible] of Supplies and Disposals, Shahjahan R[illegible] New Delhi.

Tender No.—P/SE-3/20723-E/IV.

Due by 10 a.m. on the 25th November [illegible]

Sealed tenders are invited for—

Description of Stores	Quan[illegible]
Railway Signalling Cables, SWA, 660 volts, 4 core, size 1/, 064 to B-18-60	14,[illegible]
Price per tender set	Rs. 7[illegible]

INDUSTRIAL PRODUCTION

Industries		1953	Jan. to July, 1954	Jan. to July, 1953	June, 1954*	July, 1954*	July, 1953
Major Industries.							
[illegible]	million tons	35.85	20.89	21.35	2.88	2.96	2.75
[illegible]	thousand tons	1,507	822	876	131	—	104
[illegible]	million lbs.	1,506	901	869	128	136	[illegible]
[illegible]	million yds.	4,889	2,946	2,882	432	441	[illegible]
[illegible]	million tons	3.78	2.55	2.13	0.35	0.36	0.34
[illegible]	thousand tons	869	513	514	75	81	78
[illegible]	tons	138,216	70,758	80,166	13,057	—	13,241
[illegible]	cases	590,600	2,49,200	3,65,800	34,100	—	52,700
[illegible]	thousand tons	1,297	755	1,058	Nil	—	Nil
[illegible] and Electric Industries.							
[illegible] tools	value in lakhs of Rs.	43.98	24.13	26.11	4.31	—	3.94
[illegible] lamps	millions	19.78	12.96	11.68	1.98	2.07	1.61
[illegible] cells	millions	148.50	85.60	82.88	16.69	—	13.86
[illegible]	k.v.a.	3,08,400	2,10,800	1,73,200	29,000	34,100	24,100
[illegible]	h.p.	162,100	1,08,700	1,01,500	15,200	17,000	13,600
[illegible] fans	Nos.	2,02,400	1,11,700	1,23,900	16,800	—	17,800
[illegible] receivers	Nos.	56,200	25,496	33,975	—	—	4,208
[illegible] battery	Nos.	176,400	84,900	1,00,700	16,600	—	17,900
[illegible] and wires—							
[illegible] conductors	tons	7.372	1,800	5,377	342	—	585
[illegible] wires	tons	364	99	147	29	—	14
[illegible] insulated cables and flexibles	million yds.	48.44	24.42	28.76	5.54	—	4.71
[illegible]—							
[illegible]	Nos.	547,200	2,80,300	2,86,700	48,100	—	59,700
[illegible]	million Nos.	2.46	1.65	1.31	0.24	—	0.21
[illegible] engines	Nos.	3,720	4,044	1,154	773	—	295
Chemical Industries.							
[illegible]	million mds.	86.31	65.49	76.49	16.14	6.33	4.32
[illegible] soda	tons	22,988	13,842	11,024	2,314	—	1,999
[illegible] ash	tons	56,880	28,081	32,699	2,978	3,132	4,887
[illegible] liquid	tons	8,568	4,360	4,097	787	—	760
[illegible] powder	tons	1,961	1,482	955	271	—	225
[illegible]	tons	2,302	1,587	1,228	265	—	218
[illegible] acid	tons	107,796	69,502	56,684	11,420	—	9,897
[illegible]phosphates	tons	46,960	52,403	21,506	10,700	—	5,158
Non-ferrous Metals—							
[illegible]	tons	3,758	1,918	1,955	235	—	272
[illegible]	tons	130	242	83	56	6	38
[illegible]	tons	4,920	4,023	1,882	560	623	615
[illegible]	tons	1,694	1,037	853	85	150	89
Miscellaneous (Minor) Industries.							
[illegible] machines	Nos.	42,402	48,529	33,920	6,470	7,055	5,380
[illegible] lanterns	million Nos.	4.31	2.81	2.02	0.34	0.47	0.43
[illegible]	Nos.	264,629	1,62,792	1,30,736	34,417	—	26,2[illegible]0
[illegible] tyres and tubes	million Nos.	9.24	6.35	5.23	0.91	0.91	0.87
[illegible] tyres and tubes	million Nos.	1.48	0.93	0.82	0.14	0.13	0.14
[illegible]	million Nos.	19,676	10,047	11,614	1,756	—	1,615
[illegible]—							
[illegible] sheets	million sq. ft.	49.50	30.27	30.07	4.06	—	3.85
[illegible]	million sq. ft.	11.38	5.85	8.11	0.59	—	0.96
[illegible]	million tons	0.23	0.12	0.13	0.02	0.02	0.01
[illegible]	reams	57,600	33,700	38,500	6,100	—	4,000
[illegible]	million sq. ft.	22.79	9.14	11.80	0.57	—	0.22
[illegible] manufactures	million lbs.	17.02	10.05	9.38	1.[illegible]	1.78	1.84
[illegible]—							
[illegible] type	million pairs	3.35	2.06	1.97	0.25	0.30	0.28
[illegible] type	million pairs	2.20	0.90	1.21	0.16	—	[illegible]
[illegible]—							
[illegible]	million galls.	6.23	4.02	3.32	0.63	—	0.59
[illegible]	million galls.	7.92	5.55	5.02	0.62	0.48	0.75

*Figures are subject to revision month to month.

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INDUSTRY

A Monthly Magazine for Manufacturers and Businessmen.

Editor: K. N. Banerjee.

Published in the first week of the month by

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22, R. G. Kar Road, Calcutta 4.

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Contents for January Issues.

January issue of Industry will contain many useful articles on commercial and industrial subjects such as Manufacture of Patent Leather; Use of Gums in Cosmetics; Manufacture of Cardboard and Canning Vegetables, etc. in addition to the regular features such as Agricultural Tips; Scientific Researches and Inventions; Pharmaceutical Recipes; Recipes for Small Manufacturers; Formulas, Processes and Answers; Readers Business Problems; Queries and Replies, etc.

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Industry

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REVIEW OF ECONOMIC CONDITIONS IN INDIA

EXTRACTS FROM BUGET SPEECH

LIKE other countries India has been going through a process of return to more normal conditions after the war, a process which was disturbed and delayed by the outbreak of the Korean war and its after-math. The return to "normality" commenced in 1952 and continued during 1953. Thus while at the end of December 1951 the price index of all commodities had risen from 397.1 immediately before the commencement of the Korean war to 432.2 by the end of December 1952 it had fallen to 374.5 well within the level reached at the time of the outbreak in Korea. In 1953 the variations of prices were within a narrower range than in the previous year and at the end of December 1953 the index had risen by a little under 5 per cent and stood at 392.6. Throughout the earlier months of the year and until about the middle of August there was a continuous but moderate rise in prices, largely caused by temporary factors. The supply position was slightly difficult and the difficulty was aggravated by expectations of lower output in certain important commodities like black pepper, sugar, cotton and groundnuts. The demand for certain commodities like sugar and cotton also rose owing to increased internal consumption and the psychological effect of all these factors was to generate an upward movement of prices. Measures were taken from time to time to improve the supply position and bring down prices and among these. I would mention the imposition of the ban on the export of sugar and gur, restriction on the export of groundnut oil, liberalisation of imports of coconut oil and copra, reduction in import duties on plam oil, copra, sugar and cottonseed oil, opening of fair price shops, the issue of a larger quantity of foodgrains and the reduction in the price of imported wheat supplied by the Centre. These measures played an important part in arresting the upward

movement of prices and between August and December there was a continuous decline. The general index number at the end of December was 20 points less than the peak figure reached in the middle of August. Since then there has been a slight increase but there is yet no evidence that this is not due to purely temporary and seasonal causes.

INDUSTRIAL PRODUCTION

Over a wide field there was marked increase in production during 1953. The domestic production of cloth and cement reached new records. Most of the other industries also showed a significant increase in their production. The general index number of industrial production, which stood at 128.7 in 1952, the highest for any postwar year, was exceeded in 1953, the average for the first nine months being over 133. Though later figures are not yet available, there is good reason to believe that 1953 would be the best year yet for industrial production. This achievement is noteworthy because in some very important industries, production was below normal owing to certain special factors. The strike in a steel plant resulted in a drop in the production of iron and steel, the total for which is now estimated at a little below the 1.1 million tons reached in 1952. Similarly the production of copper dropped by nearly a sixth on account of a strike. Jute manufactures were about 83,000 tons below the output of 1952, during part of which year the mills worked longer hours. Sugar production was also nearly 2 lakh tons less than in 1952 owing to a smaller acreage under sugarcane and the diversion of part of the cane supplies to the production of gur. The fact that, in spite of the drop in production in some individual industries, the general index number of industrial production in 1953 will be higher than in 1952, gives an indication of the progress achieved.

Industry, however, cannot be said to have been entirely free from difficulties. The jute industry was faced with the problem of maintaining its export market and had to be assisted by a readjustment of the export duties. The tea industry was also helped to meet a difficult situation created by the price of tea and is now in a healtheir position than it was at the beginning of the year. Lack of demand is also affecting certain industries like paints, powerdriven pumps and asbestos cement sheets. But the complaint so common in 1952 that industry in general was facing a severe recession may now be said to have largely disappeared. Nevertheless, the need for increasing efficiency and economy, especially in markets characterised by keener competition, still remains paramount.

The production of cash crops during 1953 was also good except in the case of jute, which showed a decline, partly due to adverse weather conditions and partly to fall in prices at the time of sowing.

I just mentioned the role of the private sector in mitigating unemployment. Industry has to expand and new industries providing wider opportunities for employment have to spring up in the country. To assist in such a development, Government have under consideration the question of setting up an Industrial Development Corporation to stimulate the flow of capital into new industries. Government are also exploring possibilities of bringing into existence, with the co-operation of

private interests both in this country and outside, of another Corporation to promote to the expansion of industry. These discuss'ons, in which the International Bank for Reconstruction and Development are also taking interest, are still in their preliminary stages and the House will appreciate that I am now in no position to say any thing definite about the outcome.

BALANCE OF PAYMENTS

The country's balance of payments position was generally sat'sfactory during the year that is now drawing to a close. The house will remember that for the first time, after a series of deficits earlier that year, a heartening surplus in the external accounts emerged in the third quarter of 1952. Th's trend became more pronounced in the last quarter of that year the surplus for which amounted to Rs. 38 crores, Rs. 13 crores more than in the preceding three months. From the beginn'ng of 1953, however, the surplus began to decl'ne and in the second quarter of 1953 a defic't of about Rs. 10 crores emerged for the first time in twelve months. In the third quarter of last year we nearly balanced our account, and for the last quarter for wh'ch final figures are not yet ava'lable, there may well be a small surplus. Taking the year as a whole we are likely to have a moderate surplus, which 's reflected in the Sterling balances held by the Reserve Bank, which have r'sen from Rs. 706 crores at the end of December 1952 to Rs. 723 crores by the end of December 1953. This 'mprovement has, however, been ach'eved at a reduced level of trade. Export receipts for the first n'ne months of 1953 amounted to only Rs. 375 crores, registering a decline of Rs. 125 crores as compared with the corresponding period of 1952. But this decline in export earnings has been more than ba'anced by the decline in imports which at Rs. 434 crores were less by Rs. 174 crores as compared with the previous year.

The fall in the country's export earnings is, in the main, due not to a contraction of exports but to a fall in export prices. Over the whole field of international trade we are now definitely in a buyer's and not a seller's market and the effect of this transition on prices has to be constantly kept in mind in regulat'ng the country's export trade. It is not enough to maintain the present quantities of exports and the markets for them at that level. It is necessary to offset the fall in export earnings due to a reduction in prices by expanding the country's exports. During the course of the year many export duties were readjusted with this end in view. The duties on hess'an, linseed, and linseed oil were reduced while the duties on some cotton goods and on selected jute manufactures like twist, yarn, rope and twine, hess'ans other than cloth and bags and all other descriptions of jute manufactures were totally abolished. These measures appear to have had a healthy effect and trade 'n the three principal commodities figuring in our export trade, namely, jute, tea and cotton text'les appears, in recent months, to have recovered from the d'fficulties which faced it in selling these goods abroad. In order to allow new lines of export to develop, the Sea Customs Act has a'so been recently amended to perm't the grant of a rebate of import duty on raw material and components used in the manufacture of goods subsequently exported. A special organisation to deal with export promotion has also been set up.

The reduced payments for imports in 1953, as compared with the previous year, have to be considered against the background of the special factors which accounted for the high level of imports in the latter year, in which there were very substantial imports of wheat and raw cotton. The improvement in the food position and the increase in the production of cotton has led to a contraction of imports of both in the current year. Although industrial production has, on the whole, remained buoyant, the demand for supplies of raw materials from aboard has not on a level commensurate with the higher output. Part of this may be explained by the switch over to indigenous supplies and the running down of inventories. But the position is not one which need cause anxiety, especially when one remembers the somewhat exceptional level of imports in the previous year against which the fall is measured.

DOLLAR POSITION

The improvement in the dollar position during last year was even more striking than the improvement in the balance of payments position as a whole. In the first nine months of 1952 we had a deficit of Rs. 127 crores on current account; in the corresponding period of 1953 we had a surplus of Rs. 18 crores. This improvement is largely due to smaller payments for food and cotton purchases from the United States. In the latter half of 1952 India's contribution to the gold and dollar reserves of the Sterling Area amounted to $ 70 million against a net drawal of $ 188 million in the first half of that year. In the first half of 1953 we had to draw a small sum of $ 14 million from the Central pool. Figures for the latter half of 1953 are not yet available but the preliminary figures indicate that during the five months ended last November we made a net contribution of $ 22 million to the Central reserves.

The improvement in the balance of payments position of this country has also materially assisted in strengthening the Sterling Area's position as a whole.

CHANGES IN CUSTOMS DUTIES

I shall first deal with Customs Duties.

My first proposals is to increase the preferential import duty on betelnuts by 6½ annas a pound. Profit margins on betelnuts have some time been very high, often leading to the payment of premium on import lincences. There is little justification for the importer and the middlemen retaining such profit and I am sure the House would welcome this attempt to divert a part of it for the benefit of the exchequer. I do not think that this would in any way affect the available supplies or occasion any significant increase in prices. The additional revenue from this is estimated at Rs. 3 crores.

In the budget for the current year, certain changes were made on import duties as part of the normal readjustments in these duties. Customs duties cover a very wide variety of goods and the level and incidence of these duties are under constant review so that readjustments could be made from time to time. The annual budget provides the most suitable occasion for making these changes except when, during the course of the year, it is found desirable in the public interest to make such changes without waiting for the annual Finance Bill. In pursuit of this policy I propose to make certain changes in the import

tariff. Duties on some articles like plastic and rubber insulated cables, electric fans and electric conduits are being raised. On the expiry of the period agreed under the General Agreement on Trade and Tariffs the preference given to the United Kingdom on the imports of motor cars, motor-car parts and batteries is being abolished. The net effect of these, and other minor changes, will be a net increase of Rs. 1.25 crores in revenue.

The third change I propose to make is to abolish the present import duty on raw cotton. Imported raw cotton enters not merely in the production of cloth consumed internally but to some extent in the export of Indian cloth. I mentioned earlier the arrangements which have been made for the grant of a rebate of duty paid on imports of raw materials which enter into the manufacture of our exports. The whole problem of regulating the import duty on essential raw materials came under review in that context and, while obviously no final view has yet been taken, it is felt that a move towards the gradual replacement of import duties on raw materials by Excise Duties on the goods manufactured from them could be made. This replacement seems more or less inevitable as the country is progressively industrialised; it will also make the export trade simpler by removing the complication involved in the grant of rebates of import duty. I feel that a useful beginning should be made with the import duties on raw cotton. The loss in revenue is estimated at Rs. 4 crores.

In pursuance of the same policy, the import duty on some varieties of steel—a basic material—is being reduced with immediate effect. They are steel sheets (both black and galvanised) plai rails. The loss of revenue invol likely to be Rs. 25 lakhs.

The last two proposals will be effect to by notification under S 23 of the Sea Customs Act, wh being issued soon.

CHANGES IN UNION EXCISE DUT

With the abolition of the i duty on raw cotton, I propose to the Excise Duty on super-fine c cloth by 6 pies per yard and on the varieties of cotton cloth by 3 pies a This is designed partly to replac revenue lost by the abolition of th port duty on raw cotton and part rationalise the existing structure e excise. The abolition of the in duty will avoid the complication inv in the somewhat cumbrous proc of giving drawbacks on exports. I also facilitate the free imports of fo cotton required by the industry b ducing the amount required to fir it. The increase in excise duties wi some extent, also reduced the sibility of diversion of man tures from one tariff categor another by making it less profi than at present, and will also, I ease the current pressure on In cotton. I consider that the cha taking Customs and Union Excis gether, will make the structur taxation of Indian cloth more rat than at present. The net effect of t changes will be an increase in rev of Rs. 6.5 crores.

My next proposal is to levy excise duty of 1 anna and 6 pies yard on artificial silk fabrics. The of artificial silk fabrics is now widespread and they compete to s extent with cotton cloth which ha bear an excise duty. There is no rea

way when the bulk of the cotton cloth is subject to taxation, artificial silk fabrics should be exempted. The new duty will not be levied on the manufactures of handlooms and small units which have less than 10-power looms. Art silk fabrics will also be placed in the same position as mill-made cotton textiles by the levy of an additional 3 pies per yard, corresponding to a similar leavy which is now being made on cotton cloth under the Khadi and Other Handloom Industries Development (Additional Excise Duty on Cloth) Act, 1953. The proceeds will be appropriated to the Special Fund for the development of the handloom industry. The revenue from this is estimated at Rs. 1.60 crores.

With the progress of industrialisation, revenue from Customs Duties is bound to be progressively less stable source of revenue from Customs is inevitably subject to the vicissitudes of trade policies and the availability of foreign exchange. It is, therefore, necessary to turn increasingly indigenous industries producing consumer goods for the replacement of a part of the revenue which, in the past, we used to derive from Customs Duties on such goods. It is also only appropriate that those industries which have in the past developed with the assistance of protectionist policies, for which the consumer paid by way of increased duties, should, when they have reached the stage of full development, make a fair contribution to the country's exchequer. The country's tax structure can be made stable only by broad-basing its excise without affecting the economy of the industries taxed or placing an undue burden on the consumers. We are already levying excise on most of the improvement commodities produced in the country and the scope for further additions is somewhat restricted, but even so I feel that there is room for some expansion in this source of revenue. I, therefore, propose to levy a moderate duty on three commodities, namely cement, soap and footwear. The duty on cement will be Rs. 5 per ton, that on soap Rs. 5/4/- per cwt. on washing soap in bars of one pound and more in weight and Rs. 6/2/- per cwt. on other washing soap and Rs. 14/- per cwt. on toilet and other soaps and that on footwear at 10 per cent ad valorem. The incidence of taxation on all these commodities will not generally exceed 10 per cent of value. In the case of soap and footwear the products of cottage industry will be exempted either by executive orders or definition in the tariff. From such figures as are available, I expect that the revenue from the excise on cement would amount to Rs. 1.75 crores, that from footwear to Rs. 80 lakhs and that from soap to Rs. 1.20 crores.

INCOME TAX

No changes are proposed in the income tax rates which, for the next year, will continue to be the same as at present. Certain formal amendments to the Indian Income Tax Act, intended to continue till 1956, some of the existing concessions like special depreciation allowance, exemption of profits upto 6 per cent. etc. have been included in the Finance Bill. This will maintain the status upto until Government have had an opportunity of re-examining the need for these concessions in the light of the Taxation Enquiry Commisions's Report. Opportunity is also being taken of making two small amendments, both of the nature of drafting changes, in the Estate Duty Act.

PREVENTIVE MEASURES AGAINST DISEASES OF FOWLS

"AN ounce of prevention is worth a pound of cure". These measures may be classified under three general heads, as follows :—

(1) Prevention through strong vigorous breeding stock,

(2) Prevention through care in daily management,

(3) Prevention through segregation of all sick fowls.

FIRT KIND OF PREVENTION

This is the most important measure, for good health and resistance against disease or hardiness as inherited. Likewise weakness and susceptibility to disease are inherited. It is most important, that only fowls of known and tested vigour and stamina be used for breeding purposes : No others are good enough. Of course fowls possessing all other requisite qualities should be chosen for breeding, but great care must be taken in making the selection. Vigour and vitality should be the inherited possession of all breeding fowls.

THE SECOND

Under this heading the following points must be carefully observed :

(a) The daily inspection of all fowls and all quarters, preferably early in the morning.

(b) The keeping if fowls in comparatively small flocks, say not more than 200, together and preferably not more than 50 in a flock. It is difficult to detect a sick fowl in a large flock, and disease is apt to spread rapidly in such a flock.

(c) Constant cleanliness through sweeping, removal of droppings etc.

(d) The use of disinfecting fluids or sprays such as Phenyle, Izal, Carbolic Acid, etc.

(e) The use of fire, such as blow-lamp or a quick-burning bonfire in the house and runs.

(f) Sanitation of the soil and the yards through cultivation. For this purpose, the "double-yearding system" is best. In any case the soil where fowls are kept, should be dug up and cultivated not less than twice a year, and oftener if possible.

(g) Sanitation of the houses by sunlight. All houses be so built as to allow of the sun's rays each day, preferably in the mornings. For this an east facing is best.

(h) The use of the dust bath. These should always be provided in the yards or runs, and should be kept loose and filled with good dust from the roads. In rainy weather they might well be provided in the houses.

(i) An abundance of exercise should be provided specially for all fowls kept in confinement.

(j) Clean wholesome food and good fresh water. Too much care can never be taken in providingg these. In the hot weather the drinking vessels should always be kept in the shade, and they themselves should always be daily cleaned.

(k) The use of tick-proof perches. These are absolutely essential in India.

(l) The prevention of dampness in the houses. These should be located in places where good drainage is assured but it is a good practice to have the floors elevated not less than 6 inches above the level of the outside ground.

(m) Good ventilation should be provided in the houses, and it is an easy thing to do this in a warm country like India. However it is important to see that direct draughts are avoided.

(n) During times of sickness, it is a good practice to use small quantities of potassium permanganate in the drinking water, say enough to give a light purplish tinge to the water. Such water should be kept in earthen or enamel-ware vessels—not in zinc-lined or metallic vessels.

THIRD TYPE OF MEASURES

To observe the following points under this heading is essential :

(a) The immediate removal of all fowls, showing signs of ailment to suitable "hospital" quarters. Their trouble should be studied there and the proper treatment carried out.

(b) The disinfecting of one's hands, clothes and feet before returning to the other fowls, especially after handling fowls suffering from infectious diseases.

(c) The cremation of all classes of fowls suffering from disease. This should also apply to dead rats, toads, snakes, or any other such vermin. Deep burying may do, but cremation is far more satisfactory.

(d) The quarantining of all fowls brought from elsewhere comes under this heading also. Such fowls should never be introduced to one's farm or runs before they have been kept aside for the purposes of investigation as to the possibilities of their being carriers of disease or vermin. They should be quarantined for not less than a week, after which time if nothing develops they may be allowed to enter the quarters where the other fowls are kept.

In addition to the measure mentioned above there are others such as inoculation, but those here given are simple and easy of application entailing little, if any extra cost. The use of Epsom Salts for the purpose of keeping the digestive system in good working order, say at the rate of ½ tea-spoonful per bird in the drinking water once a month and twice a month in the hot weather, it is very good practice for the poultry keeper to adopt. Healthy happy fowls are a great source of satisfaction. Let the poultry-keeper do his part to maintain health amongst the fowls and they will do their part to make him happy.

THE EXPLANATION OF A GOOD HATCH

There are many ways of obtaining successful hatches, but whatever course we adopt we shall find that there are certain fundamental principles that govern all successful hatches. Excellent results have been obtained from the sitting hen under a variety of conditions. Some follow nature and set the hen in a natural nest in the garden, if they are certain there are no rats or other troublesome pests about. It is advisable to keep as near to nature in all things; but practically everything in commercial poultry farming at the present time is artificial.

[illegible]

QUESTION OF MOISTURE AND FRESHNESS

We can control two things which take place before we actually set the eggs. These are moisture and freshness, both of which have to do with the hatchability of an egg. This question of moisture is continually cropping up from the time the egg is laid till the chickens are well feathered. It can be said that it is the greatest cause of unsuccessful hatching and rearing. When it is remembered that the average egg contains about 66% of water (moisture), and that nature intended in it such a quantity as being absolutely essential for the producing of a chicken, it is obvious that if that moisture is lost in some way or other, it will greatly affect the result, if it does not entirely prevent it. Under natural conditions the hen will bring off a good brood, as evidently the egg did not lose any of the valuable moisture. Her nest is usually in a bank, or some other corner, but always on the ground and in a nice shady place. The sun is prevented from drying up the eggs, and the moisture from the ground and surroundings keeps the eggs warm and moist.

We can, to a large extent, prevent the evaporation beforer the eggs are actually set by buying only absolutely fresh ones. If for some unavoidable reason, the eggs must be stored for several days, they must be kept in such a way as to prevent the moisture from evaporating. The material we use must not only be of such a nature that it will not absorb the moisture from the egg, but if possible that it will not absorb small amount of moisture it may lose in other direction day by day.

A BROODY HEN IS KILLED

Before setting a hen be quite certain she is properly broody. Try her for three or four days on [illegible] dummy eggs, unless she is an old hen [illegible] have set previously. It is not advisable to set pullets. Many pullets will sit tight as glue for perhaps a fortnight and then suddenly give it up as a bad job. If another hen is handy it is quite a small matter, but with a novice's limited resources it often means disaster. Often a hen becomes restless and although she remains on her nest, she is a source of worry. Generally this restlessness can be traced to vermin. Under all conditions vermin causes considerable trouble to poultry, and a dead loss to their owner but to let a broody hen be set in such a manner is cruelty of the worst kind and will bring in its train a well-deserved failure.

It is advisable to keep the eggs and nest as clean as possible. If the hen is removed each day the nest will be kept fairly clean. When the hen is off for feeding it is the best time to remove the eggs and make a clean nest if it becomes foul. The eggs may also need cleaning. They should be washed lightly with a damp cloth, but it must be fairly warm. It must also be borne in mind that the percentage of eggs hatched will depend to a great extent upon the care and handling they receive after they are laid.

AGRICULTURAL OPERATIONS IN JANUARY

FOR THE PLAINS.

Vegetables: From this month forward vegetables of every kind will need to be constantly watered, and if once or twice a week with liquid manure, all the better.

Water Squashes every day copiously. Make sowings of Radishes, Cress, Spinach and Lettuce for a succession. In the Upper Provinces peas

may also be sown during this month; but not in Bengal. Sowings of Celery may now be made for young plants to preserve through till the following cold season, if thought worth the while.

Put out young plants of Cabbage and Knol-Khol to fill up vacant places in beds. Put out young Celery plants for succession.

Celery will now be in a condition fit for earthing up to blanch. Keep a few plants of Lettuce, Mustard, and Cress for seed. Reserve one or two of the earliest formed heads of Artichoke for seed in Bengal; it is not necessary to do so in Upper India.

The plants should now be taken up for the manufacture of Tapioca and Arrowroot.

Fruits: Strawberries will now be blossoming and fruiting, and will require to be well watered; and nets or other means provided to protect them from birds.

Water Loquats copiously. Peaches, and Phems, should now be pruned.

Ornamental Plants: Commence giving surface-dressings of fresh cow manure to Roses.

Chrysanthemums will have done flowering and should be taken out of their pots, pulled to pieces, and put out in a nursery bed for a supply of new plants.

FOR THE HILLS.

Vegetables: There is little can be done in this month. As a rule the ground is covered with snow, and very few of the ordinary vegetables servive the effects of the "white mantle". The work, therefore, in the vegetable garden is at a standstill.

Fruits: The same may be said of the fruit garden. It is not known if fruits are grown under glass on any of the Hill stations, but even if they were, all that can be done is to maintain an equable temperature in the house, ranging between 50° and 60°Fahr.

Flowers: In the flower garden out of doors, the ground being covered with snow, it is impossible to do anything. It is assumed that such plants as need the protection of the stove or green house have been sheltered therein. Others that are left out of doors, such as roses, etc. should be looked at occasionally to see that they are properly sheltered. Care must be taken not to allow the temperature in the stove to go below 50°Fahr. at night. About this time a careful search should be made for insect pests, which should be destroyed or they will bring their depredations on the first approach of spring.

Alcoholic Fermentation of Molasses

THE technology of the yeast fermentation of molasses is simple and well worked out. Essentially, the process involves merely dilution of the molasses, inoculation with yeast, fermentation, and distillation. Problems of processing and control in the alcoholic molasses fermentation are much simpler than in the alcoholic fermentation of grains. In recent years, most attention has been given in the ethyl molasses fermentation industry to: (1) methods of obtaining higher yields, (2) continuous fermentations, and (3) by product utilization and disposal.

RAW MATERIALS

Blackstrap molasses, used in ethyl alcohol fermentation, is a by-product of the sugar industry, obtained after the sucrose has been crystallized and centrifuged from defecated, evaporated cane juice. The process of evaporation and crystallization is usually repeated three times until the invert sugar, nonsugar organic constituents, and high viscosity of the molasses will permit no further crystallization of the sucrose. The residue is known as final or blackstrap molasses. Blackstrap molasses is, therefore, a rather crude, complex mixture, containing sucrose, invert sugar, salts, and all of the alkali-soluble nonsugar ingredients normally present in the defecated cane juice, as well as those formed during the process of sugar manufacture.

In addition to sucrose, glucose, fructose and raffinose, which are fermentable, blackstrap molasses also contains reducing substances not fermentable by yeast. These copper-reducing, nonfermentable compounds are mainly caramels, free from nitrogen, produced by the heating necessary during sugar manufacture and melanoidins, containing nitrogen and derived from condensation products of sugars and amino compounds.

A study of the unfermentable reducing substances in molasses is of considerable interest to the fermentation industry since a more complete knowledge of the unfermentables in this important raw material may indicate how their amount can be decreased. The nonfermentable reducing content of molasses may be as high as 17% in blackstrap and as low as 5% in high molasses.

It is obvious that reduction of the nonfermentable substances would be of great economic importance. The unfermentable substances formed largely at the expense of fructose which is especially likely to undergo transformation to reducing compounds not available to yeast. If, for instance, a concentrated solution of fructose is boiled gently for a period of 16 hours under reflux, a considerable fraction of the sugar undergoes dehydration and condensation reactions that yield nonfermentable reducing substances. The resulting substance, formerly called "glutose", is a mixture of 1,3-fructopyranose anhydride, its nonreducing dimer, unfermentable substances in condensation between both glucose and fructose and the amino acids in cane juice. All and darkcoloured fructose caramel. Another type of reaction resulting in

of these reactions are accelerated by heat, both the high temperature used in processing cane juice in sugar mills and the subsequent storage of molasses under the hot tropical sun increase the amount of nonfermentable substances. Although some injury due to heat is unavoidable in the process of sugar production, there is no question that the loss of fermentability in molasses could be decreased by cooling the final product before storage and by avoiding very high sugar concentrations in such products as high-test molasses. Sugar could be regenerated from some of the condensation products by mild acid hydrolysis and this might increase the alcohol yield in distilleries operating on molasses.

Typical blackstrap molasses shows a composition within the range: solids 83 to 85%, sucrose 30 to 40%, invert sugar 12 to 18%, ash 7 to 10%, and organic nonsugars 20 to 25%. About 90% of the total sugar is fermentable by yeast.

The so-called high-test or invert molasses, is obtained by direct evaporation of defecated cane juice, no attempt being made to obtain crystalline sucrose In the manufacture of high-test molasses, the sugar is partially inverted with mineral acids or by means of yeast having a high invertase content, this inversion serving to avoid subsequent crystallization of sucrose during storage and transport.

FERMENTATION MECHANISM

The fermentable carbohydrates in molasses are sugar, principally sucrose and invert sugar. These are directly fermentable by yeast.

The prerequisites of a good yeast culture for alcohol production from molasses are: (1) Ability to ferment rapidly and efficiently high sugar concentrations, combined with (2) tolerance to high temperatures and high nonsugar solids concentrations. Tolerance to high temperatures is especially important in locations where cooling water is at a premium. Distillery yeasts are usually strains of Saccharomyces cerevisiae and are comonly maintained in the laboratory on malt or molasses agar slants and transferred at monthly intervals.

Before use in the plant, cultures are usually successively propagated in the laboratory in two stages: (1) in small flasks containing 100 to 150 ml of 12 to 15% sterilized malt extract medium, and (2) in 6-l flasks containing 4 l of sterilized mash, the sugar being supplied by malt extract and molasses. This second flask is provided with a side arm and suitable rubber-hose and pipe connections for aseptically transferring the yeast to the first plant stage.

The first plant stage, known as the pressed stage, may have a volume up to 300 gal. The mash for this stage and the following seed stage consists entirely of sterilized dilute molasses and inorganic nutrients, if necessary. The sugar concentration in these stages is usually 8 to 12%. The final stage contains up to 10,000 gal of mash and is used to inoculate the final fermentor. The final fermentors have volumes up to 125,000 gal, although some larger vessels are also in use in certain plants. Usually, an inoculum of 2 to 4% by volume of active seed yeast is used for inoculation of the final fermentors. While no reduction in efficiency is noted if a rather completely workedout seed is used, provided it has been cooled, it is usually considered good practice to use the seed yeast before more than two-thirds of the sugar has been fermented.

Considerable plant equipment and operating time is saved by the process of "seeding-back", which consists of adding sterilized mash to a relatively large volume of partly fermented active pureyeast culture. For example, from a 10,000 gal seed vessel 5,000 gal of yeast culture can be drawn off every 8 hours and the volume brought back to the original 10,000 gal with fresh, sterilized and cooled mash. As a rule, this process of seeding-back cannot be continued longer than 2 or 3 days without the yeast weakening and suffering a corresponding reduction in efficiency in the fermentor stage. At the end of this time, the seeder should be started fresh from a laboratory culture.

THE PLANT FERMENTATION PROPER

For the plant mash, molasses is diluted with water to give a sugar concentration of 14 to 18% and pumped directly into the fermentor. This mash is usually not sterilized, althouggh in certain cases it has been pasteurized with a resultant slight increase in efficiency. The fermentor is seeded when it is one-eighth to one-fourth full with a large volume of active yeast (2 to 4% of the final volume) to allow development of the yeast during the entire filling period, which may amount to 8 hours, and to avoid growth of contaminating organisms during this period.

ACIDITY

The mash is adjusted to a pH of 4 to 5 with sulphuric acid, usually 1 to 2 gal of acid being required per 1,000 gal of mash. Although the optimum pH for maximum efficiency varies with the molasses used, an initial pH of 4.8 to 5.0 is usually considered best. Hydrochloric or lactic acid may be used in place of sulphuric acid.

NUTRIENTS

Blackstrap molasses usually con- tains enough yeast nutrients to give fast efficient fermentation. In som cases, however it is desirable to add sma quantities of ammonium salts, such a ammonium sulphate, to the mash to i crease the rate and efficiency of the fe mentation. In such cases, the amoun of ammonium sulphate added vari between 0.5 and 3 lb. per 1,000 gal mash, depending on the molasses use the optimum amount being determin by laboratory test fermentatio Additional phosphate is rarely need in a blackstrap molasses fermentatio

High-test molasses is more diffic to ferment than blackstrap, since contains a smaller quantity of yea nutrients and is relatively poor buffered. From 3 to 6 lb. of ammoniu sulphate per 1,000 gal. is required an addition of some phosphate is beneficia Aqua ammonia is commonly added intervals during the fermentation high-test molasses to maintain desirable pH and stimulate the fermenta tion. The fermentation of high-te molasses is greatly facilitated if th procedure known as "slopping-back" employed. Slopping-back consists adding to the molasses mash coole dealcoholized stillage from a previou fermentation. With blackstrap mola ses, an increased yield is usual obtained when 10 to 20% of the mas volume consists of stillage from previous fermentation. When a volum greater than 30% is used, the alcoh is generally adversely affected. Wit high-test molasses, however, up to 50% of the mash volume may consist stillage. Under these conditions, th mash is well buffered, yeast nutrien liberated from the previous crop

yeast during distillation become available, and a rapid, efficient fermentation is obtained. Slopping-back is employed extensively in plants where slop must be evaporated before disposal since it results in an appreciable lowering of evaporation costs.

FERMENTATION TEMPERATURES

Fermentation are usually set at a temperature between 70° and 80°F. and are held at 90° to 92°F by the use of water sprays on the tank, internal cooling coils, or by circulation of the mash through external coolers. It is desireable to maintain the temperature of the mash below 95°F. The amount of heat liberated during the fermentation agrees with the theoretical value.

The heat produced from a fermentation involving 150,000 lb. of sugar is 39,000,000 Btu. If the fermentators are not cooled, the temperature of the mash will rise as much as 30°F.

FERMENTATION TIME

Fermentation begins promptly after the fermentor is filled and is usually active after 2 to 4 hours. Fermentation times vary with the molasses used, but a Cuban blackstrap fermentation is usually complete in 36 hours while molasses from Puerto Rico and Java require 48 and 72 hours, respectively. After fermentation is complete, the fermented mash known as "beer" and containing 6 to 9% alcohol is pumped to a temporary storage tank of "beer-well" prior to distillation..

CONTAMINATION PROBLEMS

The mash in alcoholic molasses fermentation is usually not sterilized, the chief defence against contaminants being the adjustment of the acidity to pH 5 or slightly below. Many contaminants will not grow readily at such pH levels. The fermentation is usually so vigorous that anaerobic conditions are quickly established and the alcohol produced tends to inhibit those lactic and butyric organisms that do develop. Molasses itself usually contains a relatively small flora consisting of spores of moulds, bacteria, and yeasts. Many common species of bacteria will not multiply to any extent in molasses mashes containing 15% sugars.

When back-slopping is employed, care must be taken to avoid contamination of the mash with bacteria from stillage lines and coolers, incrustations on valves, dead ends, etc., since these parts of the equipment can build up residues and thus act as foci of infection, harbouring bacteria acclimatized to and capable of growing in molasses mashes. Good practice consists of daily washing and steaming of all mash and stillage lines and coolers. When not in use these lines are preferably held under steam pressure.

In some plants, ammonium bifluoride has been effectively used as a selective antiseptic. However, the use of such antiseptics is undesirable in those plants in which the stillages are to be used as livestock-feed ingredients.

Owen has studied the effect of bacterial contamination on the alcohol efficiency in molasses fermentation and concluded that contamination has a small but demonstrable effect on alcohol yields.

The yeast fermentation of molasses is a biologically stable process and is not subject to bacteriophage or other phage attacks. As a matter of interest, it has been suggested to add bacteriophages to the alcohol fermentation to control contaminants.

Fluxes and Fluxing

THE first essential to the making of a sound soldered joint is that the metal surface to be joined shall be able to alloy freely with the solder. It is not sufficient just to bring the metal into contact with molten solder because practically all metals are normally coated with a film of oxide which prevents the tin in the solder coming into contact with the bare metal; unless it does so it cannot form the alloy, that is to say, the solder does not "tin" the metal. The oxide coating on the metal must be removed and precaution must be taken to prevent its forming again. In addition it is apparent that as the surface of the metal is to be wetted and dissolved by molten solder it must be sufficiently hot not to chill and solidify it.

The following extract from "Notes on Soldering published by International Tin Research and Development Council" is reproduced here for those who are engaged in metal business.

CLEANING JOINT SURFACES

Mechanical abrasion, with sand-paper or a fiine file, will produce a clean and soldering surface on most metals such as, copper, brass, gunmetal, bronze, iron steel, pewter, and zinc-base die castings. Lead must be shaved with a shave-hook or knife-edge ; steel wool can be used but is dangerous because the lead dust formed is poisonous and may be drawn into the mouth and lungs. Tinned surfaces such as tin plate and tinned copper and tinned brass, need only to be freed from dirt and grease and should not be scoured, for, being already coated and alloyed with tin, they are in the ideal condition for soldering. Aluminium requires special treatment because the oxide film forms again the instant it is removed.

ACTION OF FLUXES

When cleaned of oxide the metal requires to be protected temporarily against further oxidation by applying to it a flux. In general, the flux material is a liquid or paste which is applied to the metal like paint, sufficiently thickly to form a complete covering over the metal. There is no difficulty in doing this with an oily or greasy flux, but watery fluxes may tend to run into droplets leaving dry places. When this happens it is an indication that the surface is greasy, and prior to fluxing it should be washed with warm water containing soda or wiped with cotton waste dipped in methylated spirit. If the flux is a powder, like powdered rosin, it does not prevent the air getting to the metal while it is cold but during the soldering operation it melts and forms a satisfactory liquid coating; it is suitable as a flux for tinned surfaces which oxidise only very slowly while cold.

The flux should be capable of with-standing the soldering temperature without evaporating too quickly, catching fire, or decomposing, so that it continues to cover the metal up to the instant that molten solder displaces it.

The flux must also have the power

to remove traces of oxide from the surface, if any have been left after cleaning, or have formed before the flux was applied. In order to be able to remove oxide the flux must be in some degree corrosive. Tallow, olive oil, and resin are often regarded as non-corrosive and this is fairly true at room temperatures, but these substances are, in fact, composed of acids, and at soldering temperatures they are able to exert an appreciably corrosive action. A substance entirely devoid of corrosive properties would not be of practical use as a flux. Hence, obviously, the surplus flux left on work after soldering should be removed so as to prevent corrosion with the lapse of time.

A further requirement in a flux is that it shall not be capable of supplying oxygen to the surface of the metal by its own decomposition.

Lastly, a flux, as its name implies, must be able to assist the solder to flow and spread over the hot metal being soldered.

There are a number of substances which possess these properties in sufficient degree to make them useful fluxes. In some cases their merit lies chiefly in a covering action protecting the metal from oxidation, in others their ability to remove oxide from the metal is more important.

DIFFERENT TYPES OF FLUXES

"Killed spirit" (zinc chloride) is the most commonly used flux for ordinary work. It is prepared as follows:—

Pieces of scrap zinc sheet are dropped one at a time into a glass or earthen jar half filled with strong hydrochloric acid (spirit of salt, muriatic acid) and allowed sufficient time to dissolve. It is important that all the acid should be killed so that the work may not be attacked by it, and to ensure this an excess of zinc is added so that after standing for some hours without visible action some is still undissolved. The solution is allowed to settle and the clear liquid is decanted into another similar clean jar. The preparation is unpleasant because of the irritating fumes, and the strength of the killed spirits is not dependable; for this reason it is preferable to dissolve one ounce of zinc chloride, in the form of white fused flakes or sticks, in four ounces of water. Zinc chloride should be kept in a sealed glass jar because it absorbs water from the air and liquefies; the solution should also be kept in stoppered jars. Immediately after cleaning. the flux is painted over the surface to be soldered.

While the work is being heated for soldering, the water evaporates from the solution leaving fine crystals of zinc chloride on the metal. As the work gets hot enough to melt these crystals, a thin film of molten zinc chloride is formed on the metal surface and exerts a fluxing action. As the melting point of these zinc chloride crystals is 260 C. (500 F.), and tinman's solder may often be applied cooler than this, it may tend to flow over the crystals without melting them. In this way inclusion of this flux become trapped in the joint, preventing the solder from adhering to the metal and so weakening the joint.

Sal ammoniac (ammonium chloride) added to zinc chloride produces a salt that melts below the melting temperature of all ordinary solders. The lowest melting mixture is composed of 3 parts of zinc chloride with 1 part of sal ammoniac, but better results are obtain-

Sal ammoniac alone is not generally a satisfactory flux, because it volatilises, but it is the best flux for use when tinning copper bits.

"Killed spirit" (zinc chloride), often mixed with other substances such as sal ammoniac, is the basis of many proprietary soldering fluxes. The chief disadvantage of this flux lies in its extremely corrosive character. When it is used it is essential that the joint be thoroughly cleaned afterwards by washing with hot water, preferably with a little washing soda dissolved in it. If the surplus flux is fused hard, it may not all be dissolved at the first rinse, but if the articles can be allowed to stand for some hours the fused flux absorbs moisture from the air and is then readily washed away. Owing to the difficulty of removing this flux entirely, it is never recommended for electrical work. Its corrosive action persists and even a trace of it may cause serious corrosion in a short while.

Equal parts of spirit of salt and killed spirit are used on galvanised iron, nickel, monel, and stainless steel. This mixture is, of course, even more corrosive and must be left on the work for the least possible time and be most carefully washed off as soon as soldering is completed.

NON-ACID FLUXES

A class of fluxes which are much slower in their corrosive action and are satisfactory on lead, tin, copper, and alloys of these metals, are organic substances containing carbon, hydrogen and oxygen, such as olive oil, tallow, and rosin. These possess a good covering action. Olive oil and tallow (warmed if necessary) are sufficiently fluid to be smeared on the work, and they withstand heat sufficiently well. Rosin is sometimes dusted on as powder which, when heated, melts to a liquid covering the metal. It is usually more convenient to dissolve the powdered rosin in methylated spirit, industrial alcohol, or paraffin and apply this solution as the solvent evaporates a thin film of rosin remains on the work.

In course of time, the traces of these fluxes left on work after soldering may corrosion, to avoid this they should be removed by washing with methylated spirit immediately after soldering.

In recent years there have been attempts to produce fluxes less corrosive than killed spirits, but with a keener action than tallow and rosin. Naphthalene tetrachloride is one substance that has been mentioned in a number of patents; aniline and other nitrogenous compounds, sometimes in combination with hydrochloric acid, have also been mentioned. Good results have been claimed with mixtures containing lactic acid, phthalic acid, or phosphoric mixed tallow, rosin, petroteum jelly, and other materials.

FLUXES SUITABLE FOR VARIOUS METALS

The choice of the right flux depends on the condition of the surface being soldered, that is, whether it is clean or not, and also upon the metals to be soldered; the following list indicates fluxes suitable for various metals.
ed, in practice, with about 9 parts of zinc chloride and only 1 of sal ammoniac.

Lead to lead with plumbers' solder	-- Tallow
Lead to brass or gunmetal with plumbers' solder	-- Tallow
Lead to brass or gunmetal with tinsmiths' solder	-- Tallow or rosin
Tinning brass or gunmetal for soldering	-- Tallow or rosin

Clean zinc, copper, brass, etc. for bit soldering	-- Zinc chloride
Zinc, not cleaned	-- Dilute hydrochloric acid
Tinplate for bit soldering	-- Zinc chloride
Pewter and block tin	-- Olive oil, tallow, etc.
Tinning copper bits	-- Ammonium chloride or zinc chloride
Stainless steel, nickel or monel metal	-- Saturated zinc chloride in 50 per cent hydrochloric acid.
Wrought iron	-- Zinc chloride
Cast iron	-- Zinc or ammonium chloride
Brass, gunmetal or copper	-- Zinc chloride, rosin, or ammonium chloride
Bronze	-- Zinc chloride or rosin
Bismuth	-- Zinc chloride or rosin
Terne plate	-- Zinc chloride.

Aluminium and its alloys are very difficult to solder as they always form oxide films on their surfaces. Fluxes for aluminium often contain lithium chloride mixed with potassium chloride and ammonium fluoride, sometimes with addition of zinc chloride. One soldering paste for aluminium contains the chlorides of ammonium, sodium potassium, zinc and tin. But satisfactory results may be obtained if the surface is tinned before soldering aluminium articles.

Manufacture of
Gramophone Record

THE first practical talking machine was made by T.A. Edison in 1876, in this, the sound was recorded on and reproduced from the same cylinder of wax. It was difficult to duplicate the records from the original cylinder which was itself heavy and fragile and the quality of the sound reproduced was poor. In 1895, Emil Berliner perfected the first shellac disc record, as we know it to-day. Since then, the position of shellac in this industry has never been seriously threatened except when the price of this material soared up to the dizzy heights of Rs. 130-150 per cwt.

In making gramophone record the music from the studio is first recorded on a thick wax-disc, which was dusted to remove every particle of foreign matter and placed upon the turn-table. The recorder then gives the signal and the artists in the next room begin the symphony to a song. The artists follow with the air and all the time the blank is spinning with the turn-table at a uniform speed. The recording stylus is tipped with sapphire which has a definite taper and sharpness to obtain uniform results. The wax used in making the discs should be homogeneous in texture, neither so hard as to throw off small chips while cutting the groove nor so soft as to smear and must not change in physical texture on keeping. It is generally made up of several waxes, stearic acid or stearates, oleates, etc., the ingredients carefully adjusted to ensure the cutting of a perfect groove. The exact proportion of different wax is kept secret by record makers. As t groove is being cut a small vacuu sucker removes all the wax throw up by the jewel point.

The sound-grooved wax known the wax master is carefully coated wi graphite or bronze powder is careful dusted by means of a soft pad of cott wool. The more recent technique is place the wax master between two hig tension electrodes in a vacuum chambe the anode being of gold and the met plate supporting the wax being th cathode. Pure metallic gold is deposite as an extremely regular and smoot coat over the grooved side of the wa When this technique is adopted, the wa must be kept cold. Towards this en only a thin coat or wax over a meta plate is used for recording and col water is circulated under the meta plate while the gold is being sputture to prevent the wax melting under th heat of the process.

The wax record coated wit graphite, bronze powder or gold is the plunged into the electrotyping bat which deposits on its surface a coppe coating that enters into every twist an wriggle made by the recording needl within the grooves. These, of course represent the sound waves passed on by the vibrations of the diaphragm. The thickness of the copper coating is abou 0.04 to 0.5 inch. The copper plate is called the copper master and is brushed with a silver cyanide solution called

stripping solution and again electroplated with copper to a thickness of 0.05 inch. This latter copper plate is called "mother". By a repetition of the same process, a nickel-faced stamper is produced from the copper mother. In the case of nickel deposition, the stripper is a ½% solution of ammonium bichromate in water. The nickel faced stamper is often, though not necessarily, chromium-plated and backed by a thicker plate before being used in the hydraulic press for stamping records. All the above processes require great skill born of experience over several years and also mean a large outlay of capital if successful results are to be obtained.

TESTING THE SHELLAC

The gramophone stock i.e. the composition used for manufacturing gramophone records contains 25-30% shellac. It is necessary for satisfactory results that the shellac used should have a low insolubles content, a high fluidity, long life under heat and low wax content. A low percentage of impurities is preferred as insoluble particles may give rise to mechanical defects in sound grooves. When powdered shellac is melted in a glass tube and the tube is kept inclined at a definite slope and maintained at about 100°C for a definite period, it flows down the sides, and the length of flow in that period is a measure of the fluidity of shellac on which depends its binding power for the fillers used in the stock. If shellac is melted in a test tube and kept hot and molten at about 150 C, it gradually thickens and hardens to a leathery mass. The time for the conversion of the fluid mass to a rubbery condition is termed the life under heat. The longer the life of a shellac, the greater are the facility in remoulding scrap and speed from previous pressings and ease of mixing the stock for a sufficiently long period between hot rollers.

When shellac is manufactured from raw lac (as is generally done by hot filtration through cloth in the India process), the insoluble impurities are removed but the wax which occurs to the extent of 5.6% of the lac melts together with the lac and is present in the shellac in a more or less dispersed form. An excess of wax in shellac causes wax-stains on records and sometimes spots of wax mark the grooves in the records, both of which are undesirable. The addition of 2-5% copal gum helps to disperse and fix the wax uniformly throughout the stock, but special grades of shellac containing 1-1.6% of wax manufactured by solvent process, are now-a-days available.

COMPOSITION OF RECORDS

Besides 20-30% shellac, the gramophone record composition (i.e. about 70%) consists of mineral fillers like barytes, kaolin, slate-dust, silica, lamp-black, etc. Different manufacturers follow different formulas as regards the type and relative proportions of the fillers used, but the total amount of fillers does not vary much and the fineness of grinding is to about 200-300 mesh. Generally, all shellac records are coloured black by the addition of 2-5% of nigrosine, lamp black, or bone black.

Shellac is generally ground to 80 mesh, the fillers and copal gum to 200 mesh and the carbon particles are less than 0.4 microns in size. It is difficult to grind shellac in the ordinary type of disintegrators with a serrated disc motor since the heat generated by the

friction would melt the resin and choke the speed of rotation. Two types which are generally used for grinding gums and resins are the hammer and the intercalating-pin types. In these types of mills, the flakes of lac are shattered by impacts or discontinuous shearing with ample scope for air-cooling between shocks or shears.

The record stock is mixed to a uniform paste either between hot rollers moving towards each other at different speeds or in an internal masticator with a steam jacket. The plastic mass is pressed into sheets by a pair of internally cooled rollers moving at equal speed and cut into oblong slabs 7-8 oz in weight and ⅛″ thick for 10″ diameter records; these slabs are then taken to the press-room for the actual stamping of records.

A typical semi-automatic press is generally used in this industry. Its capacity is 80-100 tons pressure over the ram and the power is supplied through leads from a hydraulic accumulator. On the two faces of the press, platens are fitted with internally cored parallel channels or spiral channels having a central inlet and a peripheral outlet. The stampers are fixed on these cored plates. A blank slab of composition is softened on steam-table, rolled up as a ball, placed on the lower stamper and the head or the upper stamper is lowered and locked by a turn of a handle.

The following cycle of operations follows automatically:— (1) the ram of the press pushes up, exerting about ¾ ton pressure per square inch of the whole stamper surface, while steam at 90 lbs pressure circulates during this period through the cored platens to retain the appropriate plasticity of the stock; (2) the steam supply to the platen channels is cut off and cold water is run through and (3) the ram recedes. The top platen with the stamper fixed on it is now tilted back and the moulded record with some flash is removed from the stamper. On so opening the platens, the water supply is automatically shut off and in its stead a current of steam flows through the cored channels in the platens, getting the press ready for the next record. A complete cycle of operations for producing each record takes less than a minute. With skilled operator, the rejects due to faults are very few. The rejects, flash and trimmings absence of distortion during hardening are, however, ground up again for moulding. Gramophone record moulding has been developed almost to perfection as regards economy of time, materials, and the playing qualities of the finished disc.

LAMINATED RECORDS

Laminated gramophone records are made by laying a thin coating of the usual shellac stock for gramophone records on either side of a disc of fibre-board and impressing the sound grooves from a stamper as usual. These records, however, have not been very popular due to the fact that the central fibre core is affected by atmospheric humidity, leading to distortion and chipping off of the shellac layer.

Several synthetic resins have been tried as substitute for shellac in the manufacture of gramophone records, and in all cases, so far, they have either proved unsatisfactory or prohibitively expensive.

HOME RECORDING

Home recording i.e. recording music or speeches at homes and reproducing

them at will has a peculiar fascination, and the art has been tried to be developed time and again without much success. So far, gelatine, phenol-formaldehyde resins, and alloys of aluminium and copper have been tried as surfaces for sound-grooving, but each of the above has got its limitations. Gelatine surfaces, though considerably hardened by formaldehyde, absorb moisture, whilst with phenol-formaldehyde rising a distortion of the grooves takes place during the process of heat-hardening. With alloys, it is difficult to remove the strips and brushes coming out of the discs while cutting the grooves. The criteria for a successful surface are initial softness at the time of cutting the sound grooves and followed by sufficient hardness to withstand needle scratch for a reasonably large number of times. Modified shellacs, or shellac cellulose-ester combinations are being investigated at the Indian Lac Research Institute towards this development. Aluminium discs coated with special shellac compositions have been found to take good impressions when pressed in the hydraulic press in contact with the master stamper. Such records have the advantage of not being warped due to temperature changes, and their durability is satisfactory. Records made from such surfaces have given undistorted sound even after playing 100 times. If some arrangement could be established by gramophone companies to receive the metal discs back at a reasonable price, after a record has been played for a considerably long time, it is expected that considerable economy would be effected in the process.

Soap for Battling Disease

By Dr. W. Schweisheimer.

THE cleansing qualities of good soap are extremely helpful in battling disease—not only in the general sense that cleanliness and removal of dirt means hygeinic life, but also because soap supports the removal of dangerous germs from the skin. When an epidemic grippe goes through country and community you can hardly avoid shakings hands with a potential patient who by sneezing and coughing had brought grippe virus on his hands. You can avert most of the danger by washing your hands with soap and water after his hands have touched yours. Gargling with salt water or a mouth-wash, and washing the hands with soap and water are the most important means of protection against infection.

SOAP FREES THE SKIN FROM GERMS

Dr. H. E. Merton, Bacteriologist of the University of Pennsylvania has given an extensive report on the action of soaps in freeing the skin of germs to the American Medical Association. The skin not only serves as a mechanical barrier to the entrance to germs into the body, but also destroys many bacteria. Former investigations by Arnold and his associates showed that dirty skin of workmen's hands had little destructive action, while after washing, there was rapid destruction of germs.

Walker has stated that through washing of the hands with formation of a good lather with ordinary soap was sufficient to destroy any adhering diptheria bacilli, streptococci and pneumococci. Typhoid bacilli were less affected, and staphylococci (the germs usually present on the skin) showed themselves much more resistant. The activity of the soap was greatly increased by raising the temperature. Washing in warm water is more efficient than in cold water.

Streptococci were very susceptible to yellow household soap. Influenza (Grippe) bacilli were susceptible to the germ-destroying action of soaps. Walker showed that the germs of manengitis and gonorrhea were killed in an exposure of 2½ minutes at 20°C. by 1.640 dilutions of white floating soap, coconut oil soap, brown bar (laundry) soap, perfumed soap and olive oil soap.

The gonococcus was even more susceptible, being killed by dilutions of 1 : 1.280 of white soap and coconut oil soap. Refined toilet soaps had less germ-destroying effects on streptococci than yellow house-hold soap.

Merton tested different medical soaps on the market which are claimed by the manufacturers to be germ-destroying.

CONCENTRATION OF SOAPS

He made interesting observations on soap concentrations in washing. A minute is probably the length of time a person uses soap in the careful washing of the hands, excluding surgeons. A 1 : 50 or 1: 100 dilution of soap will not lather when washing hands. When

lather is produced, it is an indication that the concentration of the soap is greater than 2 per cent. Walker stated that the concentration of soap in good lather is about 8 per cent. In hurried washing it may be as little as 0.30% and in prolonged washing it may be as high as 20%.

Recently the Journal of the American Medical Association was asked whether all tincture of green soap should be sterilized which is used in the preparation of patients for operation. This is a troublesome procedure, since the soap becomes spilled or bubbles out into the auto-clave. According to the Journal's expert, many men have substituted plain white for tincture of green soap both for washing their hands before operation and for preparation of the fields of operation. Clinical observations have indicated that as a result of this substitution better results are being obtained as far as healing is concerned. Plain white soap is less irritating both to the hands of the surgeon and to the skin of the patient. The white soap that is used is not sterilized.

PHENOL SOAP AND GERMS

Dr. Eugene. F. Traub, Newhall and Fuller described the use of a new synthetic phenol compound, designated as G-11, in soap. G-11 is a whitish powder, hexachlorophene. The regular use of toilet soap containing the compound in a concentration of 2 per cent reduces the number of germs on the skin. A person using this soap regularly has a lower germs count after two minutes of washing than a person who washes for twenty minutes with ordinary toilet soap.

Thus the daily use of a soap containing G-11 would enable a surgeon or operating room attendant to shorten the routine pre-operative scrubbing procedures and perhaps more economy in the use of alcohol and iodine. Many hospitals have changed their routine ten-minute scrub to a three-minute wash when using the hexachlorophene soap. Checks on hands of surgeons who had worn rubber gloves for an hour, showed that bacteria count doubled after ordinary soap was used. But after the use of G-11 soap, there were only half as many bacteria on the skin, because the hexachlorophene absorbed by the skin continued to kill the germs.

Regular use of G-11 soap should reduce the probability of infection following skin abrasons and superficial wounds. Dr. Traub and his associates checked records of nearly four hundred patients in a mental hospital for the eruption of boils and curbuncles during whole year. Then G-11 soap was introduced into the hospital's baths and washrooms. A year later it was shown that during the year there had been only 11 per cent as many curbuncles, 22 per cent as many boils.

Dr. Traub and his associates suggest the use of G-11 also in soap and other material for protection against skin infection from barber shops or beauty parlours, against hair fallicle infections from cutting oils and the like. Dr. John Hendersion, medical director Johnson & Johnson, added, G-11 to baby lotion. The incidence of skin infections among babies not given the lotion was as high as 55 per cent in leading hospitals while among babies treated routinely with the lotion, only 2 per cent.

SOAPS AND WOUNDS

A study by Edward Adolphe in The Saturday Evening Post gave evidence that in war-surgery an ordinary cleaning of the wound with soap and water played an important part. After treating the wounded for shock, with plasma, wounds were cleaned in this simple way. Surgeons at the base hospital sent this prescription to doctors at the front: 'Clean those wounds first. Use soap and water, use anything at hand, but clean those wounds. Remove bits of hair clothing mud and splinters of branches immediately. Then use the sulfa drugs.

It is a general opinion of modern surgery that wounds should be kept clean, not by strong antiseptic solutions, but by simply removing unclean things such as hair, mud, etc., and washing the surface with soap and water, also by trimming away the dead and dying flesh. The soap and water treatment supported by modern chemical and antibiotic drugs, has its limits, of course. But the statistical result of this simplified modern approach to wound healing seem to be excellent.

Prevention of rabies by local treatment of bites inflicted by rabid animals has occupied the attention of physicians from earliest times. Drs. H. J. Shaugnessy and J. Zichis, Chicago, used 20 per cent soap solutions for such local treatment apparently with good result.

— ALCHIMIST.

Imitation Pearls and Their Manufactures

THE making of imitation pearls was invented by a Frenchman named Jaquin. When the silvery material found on the surface of many species of fish was applied to beads it gave them a lustre closely resembling that of pearls. At first solid beads were coated with a gelatin solution containing pearl essence. But although these imitation pearls were not damaged by water, they were easily crushed. However, it became possible to make indestructible pearls by coating opal glass or other solid beads with a suspension of pearl essence in a waterproof lacquer. This is the most popular type of imitation pearls produced today.

Most species of fish owe their sheen to a deposit of thin blade like crystals of guanin in the epidermis of their scales. When the epidermis is rubbed off under water, it is partially disintegrated and lustrous particles are suspended. If this suspension of guanin crystals is strained through cheesecloth to eliminate coarse particles, crude essence settled to the bottom.

Chemically speaking, guanin is 2-amino-6-oxypurin. In animal body it occurs with other groups in nuclei acids, which in turn are combined in the complex proteins found in cell nuclei. Guanin is insoluble in water, alcohol, ether, chloroform, ethyl acetate, amyl acetate, acetic acid, formic acid, lactic acid, hectic acid, etc. It is very slightly soluble in cold ammonium hydroxide and more soluble in hot ammonia solutions. It is soluble in dilute mineral acids and in solutions of potassium and sodium hydroxide.

As pearl essence is the main substance for the manufacture of imitation pearls, its preparation is taken up first before dealing with the actual manufacture.

MAKING OF PEARL ESSENCE

First the lustrous material from the scales is scrubbed off in a large agitator, only a little water is used. Then the lustrous sediment is separated from the wash water. This is usually done in a basket centrifuge. When the partially dried sediment is scraped out of the basket, it is ready for purification.

AQUEOUS SUSPENSION

In making aqueous suspension the lustrous crystals should be treated several times with dilute ammonia solution. After each treatment the crude essence is allowed to stand in a cool place until the crystals settle; then the ammonia solution is decanted and the treatment repeated several times. The ammonia gradually dissolves the epidermis and leaves the crystals sufficiently clean for use. Pearl essence prepared in this way can be preserved indefinitely if sufficient ammonia is present.

NONAQUEOUS SUSPENSION AND LACQUERS

Pearl essence is often marketed in the form of suspensions in acetone and

amyl acetate. It is also sold in the form of lacquers. The method of preparing these lacquers is described below:—

The scales are washed free of adhering lustrous matter and the water is drained off. This suspension in water is allowed to subside and the suspension water decanted off. The remaining thick fluid, containing lustrous particles of guanin, is treated with a digestion mixture of pepsin, 2½ grm. and glacial acetic acid, 30 c.c. to each litre of fluid, and allowed to stand for 48 hours. This mixture completely digests and removes all proteinaceous matter from the guanin crystals. Hydrochloric or other mineral acids cannot be used to activate the pepsin because these readily dissolve the guanin crystals, while acetic acid does not.

After 48 hours' digestion the pepsin-acetic acid mixture on the surfaces of the guanin crystals are clean. Since they now possess the peculiar property of being more readily wetted by ether and certain other nonaqueous liquids than by water, they are separated from the fluid mass, as follows: Ether is poured into the vessel containing the digestion mixture and guanin crystals and allowed to form a separate layer on top. The vessel is then gently rocked. The lustrous crystals of guanin, being more readily wetted by the ether, leave the water and pass into the ether, leaving behind all dirt, organic matter, and the like. Fatty substances also pass into the ether, but the crystals are allowed to settle out. The oily ether is decanted and replaced. The ether is replaced once or twice, removing all the oil and fat. The lustrous material, now clean, can be kept indefinitely in ether, or easily transferred to ethyl or amyl acetate, forming a pearl lacquer which is applied directly to the bead. Ethyl acetate is preferable because of pearl essence or lacquer can be produced by this process.

VARIETIES OF IMITATION PEARLS

As mentioned above there are four major types of imitation pearls. These are :—

(1) Those made by coating the inside of hollow glass spheres with pearl essence. (2) Those made by coating the inside of hollow glass spheres with pearl essence and then filling the spheres with wax or some other material to give weight to the pearl. (3) Those made by coating the exterior or solid glass spheres with pearl essence (known in trade as alabaster). (4) Those made from plastic beads: either a naturally lustrous plastic with a coating containing mother-of-pearl may be used.

HOLLOW GLASS BEADS

The hollow glass beads used in making imitation pearls are of two types. The cheaper ones are made by blowing thin glass tubing into a mould, resulting in a number of connecting bulbs which are cut apart after the glass cools. These beads are coated inside with a suspension of pearl essence in gelatin solution. When this is dry, the beads are filled with paraffin or other wax. Such beads are light and will usually float on water. Sometimes barium sulphate is added to the wax to make them heavier and whiter.

The better grade of hollow beads is made of specially selected, soft, colourless glass tubing. The tubing is sealed

at one end with a blow torch and a bulb of the desired shape and size is blown. A sheet metal mask, with a hole slightly larger than the hole desired in the bead, is pressed against the end of the bulb or bead, and a small pointed flame is directed against the hole. A hole is blown through the glass and the edges retracted and smoothed by brief contact with the flame. The bead is then cut away from the glass tube. The hole at the cut end is also smoothed in the flame with the help of the mask. After these beads have been coated inside with a pearl essence suspension in gelatin solution or in a lacquer, they are filled with wax or wax containing barium sulphate.

SOLID OR INDESTRUCTIBLE IMITATION

Solid beads made of opal glass are often used for the indestructible type of imitation pearls. The exact degree of opalescence affects the appearance of the finished bead and is varied in practice to give the desired tint. The beads are made from glass tubing, having a capillary bore of the right size for stringing. The tubing is cut into short lengths and strung on a small iron or copper wire so that these pieces are held in a gas flame and rotated until the desired globular shape is attained. They are removed from the flame and rotated cool.

Another method of making beads is to tumble the short lengths of tubing into a mixture of fireclay and graphite until the holes are plugged. They are next placed in an iron drum containing powder talc which prevents them from sticking together. The drum is slowly revolved while it is heated hot enough to soften the glass and the pieces slowly assume the desired globular shape. They are revolved slowly as they are cooled. After they have been cleaned and the clay-graphite mixture removed from the holes, the beads are ready for coating.

ALABASTER BEADS

Many of the best imitation pearls are made from alabaster beads which are usually handmade. A drop of molten alabaster on a wire is spun in a flame until a smooth, round bead is obtained. After cooling the wire is dissolved in acid, having a hole in the centre of the bead for stringing. The resultant bead is translucent and makes beautiful imitation pearl.

DIPPINGLY THE BEADS

In making imitation pearls the opal glass, alabaster, or plastic beads are coated with a lacquer containing lustrous guanin crystals in suspension. One commonly used lacquer comprises 50 grams of guanin crystals, 35 grams of 20-30 nitrocellulose, and 369 grams of amyl acetate per pound; 1 to 10 coats of this are applied to the bead, to prepare such a lacquer it is only necessary to dissolve nitrocellulose in a suspension of pearl essence in amyl acetate. If concentrated lacquer is used, it may be mixed with a clear lacquer containing about 10 per cent nitrocellulose.

In effecting the actual dipping operation a toothpick is pushed into the centre of each bead. As many as 500 toothpicks with a bead affixed to each are put into holes in large dipping boards. One or two boards with beads on the underside are lowered until the beads are submerged in pearl lacquer,

After a moment the boards are raised, removed from the dipping frame, examined, and mounted on a machine which rotates slowly to insure an even coat while drying. Each dip takes from 1 to 2½ hours to dry. When dry the coated beads are dipped again. The cheaper imitation pearls are given 4 or 5 dips, whereas the high grade ones receive 9 or 10 dips. The rooms in which the dipping is carried out should be free from dust and preferably air-conditioned.

THREADING AND CLASPING

The final step in the production is threading and clasping. The imitation pearls are graded and matched then strung on strong thread. Double nylon thread is used for the best necklaces.

COLOURS

Imitation pearls are made in a wide variety of colours; rose, pink, cream, white, orchid, peach, yellow, green, blue, etc. These colours are imparted by tinting the lacquers with dyes.

Scientific Researches and Inventions

TUBELESS TYRE UNHARMED BY NAILS

A new tubeless tyre that can be pierced by nails without losing any air has been developed by the Goodyear Tyre and Rubber Company of Akron Ohio. The tyre is the result of five years' intensive research and development work, the aim of which was to create a virtually puncture-proof tyre. The new tyre is an airtight single tube which is considerably thicker and heavier than the ordinary tyre. There is no inner tube, as in conventional tyres. The tyre can continue in service when pierced by nails or broken glass because the carcass is built from a specially treated combination or rayon, nylon and rubber cords. The carcass is so made that is warps around nails or other objects that penetrate it, making them virtually a part of the tyre. If a puncture is developed, there will however, be only a slow leak. The danger of sudden blowouts is eliminated.

ATOM ADVANCES STUDY OF ANIMAL NUTRITION

Radioactive isotopes produced in an atomic reactor are being extensively used by the U. S. Department of Agriculture to discover new facts about animal nutrition and diseases. The purpose of these studies, according to Dr. Byron T. Shaw of the Department of Agriculture is to help farmers combat animal diseases and to develop better feeding methods and healtheir animals. He says: "Important studies are now being made with radioisotopes of the way in which milk is formed in the cow". Radiocarbon—the radioisotope of carbon—is being used to trace acetate and other compounds circulated through the cow's mammary gland and to trace glucose injected into her blood stream. With radioactive nitrogen, scientists are gaining more knowledge about urea as a supplementary source of nitrogen for cattle. Radioactive cobalt is being used to study the function and utilisation of vitamin B-12 in sheep and chickens, and radioactive calcium and phosphorus to study the formation and metabolism of bone. Also, in certain perplexing animal diseases, such as leukosis and Newcastle disease in poultry, tests are being made with radioactive isotopes. In the opinion of Dr. Shaw, "since all animal feed nutrients contain carbon, the radiaisotope carbon 14 is especially useful in studying milk secretion, the physiology of reproduction, the growth of wool, egg production, and factors affecting the use of feed nutrients such as proteins, fats and carbohydrates. For years it has assumed that non-ruminant animals such as chickens and pigs cannot utilise sulphur in the inorganic form. Now using radioactive sulphur, scientists of the Department of Agriculture have recently found that the chicken can utilise inorganic sulphur and incorporate it into the amino acid cystine, which is one of the building blocks of proteins".

ANTIBIOTIC MIXTURE CONQUERS DREAD PLANT DISEASE

World's struggle for adequate food supplies has just been disclosed in the fruit-growing centre, Marysville (California). In a 160-hectate commercial pear orchard here, a mixture of the antibiotics terramycin and streptomycin has scored an impressive victory against fire blight, one of the most virulent of the bacterial plant diseases which annually exact a heavy toll from crops throughout the world. Announcement of the achivement was made recently by Mr. John C. Dunegan, principal plant pathologist of the US. Government Deparment of Agriculture. He has reported that the two antibiotics combined in a mixture called agri-mycin, were sprayed on 300 pear trees.

Another 300 trees in the same orchard were sprayed only with water and among these, 268 cases of fire blight developed. Only five cases of the disease were discovered among the 300 trees treated with the antibiotics. Fire blight-so called because of the lightning-charred appearance it gives to affected trees—is estimated to cause some 570 million worth of damage annually to fruit trees in the United States alone. The agri-mycin combination is the product of years of research by the discoverers terramycin, scientists of Chas. Pfizer & Co., Inc., of New York, world's largest producer of antibiotics. While terramycin and stereptomycin have long proved their value in saving countless human lives from infectious disease, the orchard experiment here marks their first large-scale commercial application against a bacterial disease of plants. Preliminary experiments also have shown agri-mycin to be affective in treating other agricultural plagues, including those affecting beans, potatoes, pepper and w... Results of the experiment here ha... been seen as encouraging wider app... cation of the antibiotics in agricultu... and the hope that similar cures will ... found for other bacterial plant disea... whose ravages have hampered wo... food production.

NEW WOOL TEXTILE MACHINE

A new textile machine, called t... Raper Autoleveller, which is claim... to be the most dramatic development ... the wool textile industry during the pa... 50 years, is now being produced at ... Keighley factory. Designed by M... G. F. Raper, the machinery reduces th... number of stages required in the draw... ing wool silvers from eight to fou... Wool silvers vary in thickness and, b... fore the Autoleveller was developed, th... only way of getting rid of the lack ... uniformity was to put them togeth... and draw them down in a series ... separate processes. The cost of th... machine is about £ 4,000 and it is claim... ed that, apart from a 50 per cen... Saving in labour costs, the capital sa... ings in the adoption of the machine wi... also be considerable. At present, th... Autoleveller can be used only in mil... which use the Bradford system of spin... ing. Research, however, is going on ... an attempt to extend this method ... spinning worsted yarn to the Continen... tal and American systems.

WELDED STEEL TUBING FOR AEROPLAN... SEATS

Australian designers have give... careful attention to the construction ... passenger seats in aeroplanes, and ... company in Sydney, New South Wale...

is making a special type of seat for this purpose. To increase the popularity of air travel tourist-class has been introduced in Australia at considerably cheaper rates. *This has been achived* by carrying more passengers per aircraft in lighter and more compact chairs. The frame-work of the chairs is made of 22 gauge steel tubing, and as Australian aircraft safety standards are higher than those of most other countries, steel of 30 tons sq. in tensile is being used. Joints of equivalent strength are necessary, and these are obtained by bronze welding. Bronze weld'ng is more suitable than fusion welding because of the ease of application, the lower temperature of the weld area, and the fact that the operator has more control of the penetration of the filler metal into the joint.

NEW TREATMENT EFFECTIVE AGAINST BEETLES

Research work by scientists of the U. S. Department of Agriculture has resulted in a new, easier method of destroying Japanase beetle larvae in balled nursery stock. The new method which consists of injecting an ethylene dibromide solution into the balls of soil around the plant roots, is simpler and less costly than methods formerly used. Plants given ethylene dibromide injections can now be cert'fied by the Government for shipment or sale outside infested areas now under Japanese beetle quarantine regulations. Any soil in the root balls that it not excessively wet or dry may be treated. The treatments may be used on any size of soil balls and plants may be either wrapped or unwrapped. The solution is injected into the soil balls with an oversize syringe as a liquid, but once re!eased in the soil, it becomes an insect-killing gas which penetrates the ball.

BETTER CLASS SAGGARS

The problem of developing better class saggars from indigenous raw materials in India was entrusted to the Central Glass and Ceramic Research Institute, Calcutta, in 1950. Detailed studies of raw materials employed in saggar bodies compounding of bodies from them and the properties of bodies thus prepared have since been conducted at the Institute. The saggars made from compositions developed at the Institute have given satisfactory performance have given satisfactory performance under factory conditions and as many as 20 firings have been obtained in a number of cases.

It may be noted that saggars (refactory containers in which ceramic wares are placed for firing in kilns) play an important part in the economy, of pottery manufacture. Studies on the design performance of saggars and characteristics of saggar and bodies carried out in foreign countries have resulted in long saggar life (15 firings or more as compared with 5-6 firings obtained with saggars in use in India) and, consequently, low cost of production of ceramic ware.

Pharmaceutical Recipes

RING WORM OINTMENT

I.

Creosote oil	10 parts
Hard paraffin	40 "
Soft paraffin	50 "

Add creosote oil to the melted paraffins. Stir until cold.

II.

Chrysarobin in powder	4 parts
Soft paraffin	96 "

Triturate the chrysarobin with a portion of soft paraffin until smooth. Gradually add the remainder.

Stains produced on the skin by this ointment can be removed by a solution of carbonate of soda.

III.

Paraffin wax	1 lb.
Yellow vaseline	1 "
Chrysophanic acid	2 oz.

Melt on water bath and mix for some time.

IV.

Chrysarobin	1 gr.
Benzoated lard	24 grs.

V.

Salicylic acid	2 dr.
Chrysarobin	1 "
Benzoated lard	4 oz.
Creosote	1 fl. dr.

VI.

Salicylic acid	320 grains
Benzoic acid	480 "
Resorcin	240 "
Coconut oil	1 oz.
Lanolin	1 lb.

Mix intimately.

ITCH OINTMENT

I.

Zinc oxide	15 parts
Benzoated lard	80 "

Mix by trituration.

II.

Vaseline	12½ oz.
Flowers of sulphur	2 "
Bicarbonate of potassium	1 "
Oil of bitter almonds	1 dr.

Put the vaseline in a glass or porcelain vessel and place it over a slow fire. When it is completely melted, remove from the fire and incorporate the other ingredients one by one.

III.

Chalmugra oil	10 parts
Hard paraffin	40 "
Soft paraffin, white	50 "

Add oil to the melted paraffin. Also used in eczema, leprosy, etc.

BARBAR'S ITCH

Ichthyol	30 grains.
Salicylic acid	12 "
Mercury oleate (10 p.c.)	3 drachms
Lanolin	1 ounce.

Mix. To be kept constantly applied to the affected parts.

GREEN SALVE

White turpentine	8 ounces
Lard, fresh	8 "
Honey	4 "
Beeswax, yellow	4 "

Melt, stir well, and add

Verdigris, powdered	4 drachms.

Apply locally. This cannot be

surpassed when used for deep wounds, as it prevents the formation of proud flesh and keeps up a healthy discharge.

BALM FOR ULCERS, BURNS, ETC.

Boric acid in powder 1 part; Soft paraffin 4 parts; Hard paraffin 2 parts. Melt, mix and stir till cold.

II.

Lard, fresh	16 ounces
White lead, dry	3 "
Red lead, dry	1 ounce
Beeswax, yellow	3 ounces
Black rosin	2 "
Common turpentine	4 "

Mix all excepting turpentine, melt, and boil for 45 minutes, then add turpentine. Boil for 3 minutes and cool.

Apply locally to cuts, burns, sored ulcers, etc. It first draws and then heals.

ECZEMA CREAM

Acid salicylic	40 gr.
Resorcin	40 "
Calaminae	2 dr.
Zinc oxide	4 "
Oil of cade	2 "
Starch	½ oz.
Vaseline	1 "
Adipis lanae	1½ "

To be applied locally.

ECZEMA LOTION

I.

Acid Carbolic	12 mins.
Bismuth Subnitrate	1 dr.
Glycerine	4 „
Rose Water	4 „

II.

Zinc oxide	20 oz.
Starch powder	20 "
Glycerine	15 "
Glyc. acid carbolic	19 "
Liq. picis carbonis (sol. of coal tar)	20 "
Water	1 gal.

To be used as lotion for washing the eczema.

ECZEMA OINTMENT

I.

Liq. picis carbonis	2 dr.
Pulv. zinc oleate	3 "
Paraffin liquid	q. 6 "
Paraffin, soft	2 oz 2 "

II.

Acid boric	40 gr.
Acid carbolic	½ dr.
Sulphur	½ dr.
Camphor	½ "
Ichthyol	½ "
Starch	½ oz.
Znc ointment	1½ "

III.

Lanolin	200 oz.
Petrolatum	200 "
Beeswax	50 "
Phenol	5 "
Camphor	10 "
Oil of eucalyptus	50 "
Salicylic acid	10 oz.
Perfume to suit	q. s.

IV.

Zinc sulphate	30 gms.
Hard soap shavings	90 "
Boiling water	q. s.
White soft paraffin	q. s.

ADHESIVE FOR CELLOPHANE PAPER

(a)	Gelatine	100 parts
	Water	500 "
(b)	Citric acid	100 "
	Water	500 "
(c)	Alcohol	120 "

Make (a) by swelling for several hours and dissolving on the water bath.

Mix with solution (b) and mix thoroughly.

SOLIDIFIED ALCOHOL

Alcohol	4 gals.
Stearic acid	300 grams.
Caustic soda	40 "
Water	4 oz.

Heat alcohol on a steam bath to about 160°F. Add the molten stearic acid in a thin stream to the hot alcohol and stir properly. Now add the caustic soda, dissolved in the water, slowly while stirring. Fill in cans and let cool.

SIMPLE BAKELITE TYPE RESIN PLASTIC

Phenol	376 grms.
Formaldehyde	450 c. c.
Ammonia (Sp.gr. 0.88)	10 c. c.

Put the mixture into a beaker immersed in a boiling water bath for 1½ hours. As the molecular weight of the resin increases, the clear solution becomes turbid, and finally it separates out as a liquid which solidifies on cooling. The upper aqueous layer is decanted, and the solid resin carefully melted in a porcelain basin and the water distilled off. This dehydration needs care or the molten resin will froth up. The dehydrated resin should be quite clear and set hard on cooling.

Having prepared the resin, it is interesting to try moulding it. After being ground to a fine powder, the resin should be mixed with about 20% of wood flour and kept as much hexamethylenetetramine (made by evaporating to dryness a mixture of formalin and 0.88 ammonia solution in excess). The mixture can then be put into a suitable mould and heated under pressure to a temperature of about 140°—150°C. The time required for heating depends upon the length of time the resin is in water bath during the first stage, and also upon the amount of hexamethylenetetramine used, but it should not be more than three to five times.

BAKING POWDER

Tartaric acid	2 lbs.
Bicarbonate of soda	3 "
Flour	3 "

Powder the above ingredients and thoroughly dry separately by gentle heat. Mix them in a dry place, sift the mixture, and at once put into packages. This will yield good baking powder for raising flour in the preparation of bread and cake.

LIQUID BED-BUG DESTROYER

Oil of Eucalyptus	1 drachm.
Eucalyptus leaves	1 oz.
Benzine	2 "
Turpentine oil	2 "
Kerosene oil to make	16 "

Mix the turpentine, benzine and kerosene oil and macerate the eucalyptus leaves in it for 24 hours; then strain and make up the measured volume having first added the oil of eucalyptus.

BINDI STICK

Wax	1½ dr.
Almond oil	3 "
Carmine	6 grains
Otto of rose	6 drops.

Melt the wax over water bath then incorporate the oil. Now dissolve the carmine in just enough solution of ammonia, put in a warm mortar, and add the bases. Next remove from the water bath and incorporate the otto. When almost cool the mass is cast into moulds of desired length.

HYDRAULIC BRAKE FLUID FOR AUTOMOBILES

Castor oil	10 parts
Denatured alcohol	10 "

Mix. The alcohol thins the oil and acts as an antifreeze. The castor oil lubricates the piston and is the fluid through which the pressure is transmitted.

CEMENT FOR MOVIE FILMS

This quick drying adhesive is very effective in bonding celluloid to itself or connecting lengths of motion picture films.

Cellulose nitrate or clean Transparent Celluloid Scrap	10	parts	by weight
Acetone	8	"	"
Methanol	27	"	"
Benzol	45	"	"
Methyl cellosolve	10	"	"

For use with movie films, the gelatin emulsion surface is removed with sand paper or scraped off with a pen knife. Other celluloid surfaces should preferably be cleaned and slightly roughened. The above liquid is applied with a brush and the moistened surfaces pressed together.

VEGETABLE COLD CREAM

Almond oil	550 parts
Water	250 "
Borax	10 "
Water	250 "
Otto of rose	5 "

Melt the wax on a water-bath. Then add the almond oil and warm the whole to about 80°C. In another vessel dissolve the borax in the water and heat it to 80°C; then slowly stir into the first. Mix thoroughly and allow it to cool. Then add the perfume and put into suitable bottle. If a brilliant white surface is desired pour the cream while it is still in the liquid condition.

TIN SLATE

125 C.R.L.M., Comilla — Wishes to have a process of making tin slate, ultramarine blue, casein plastic, etc.

First prepare the silicate solution by finely crushing equal parts of solid potash and soda silicate and pouring over this 6 times the quantity of soft river water, which is kept boiling for about 1½ hours, whereby the silicate is completely dissolved. Next take 7 parts of slate fine ground with a little water into impalpable dust and mix with 1 part lamp black. Grind enough of this mass with the previously prepared silicate solution as is necessary for a thick or thin coating. With this compound rough tin plates are painted uniformly and allowed to set.

Ultramarine Blue

China clay	100	parts by	weight
Sulphate of soda	41	"	"
Carbonate of soda	41	"	"
Carbon	17	"	"
Sulphur	13	"	"
Sulphite of soda	26	"	"

Take the ingredients free from iron and grind fine. Next heat in a muffle furnace in closed pots. This produces white ultramarine and turns green on exposure to air for some time. The latter is mixed with 4 per cent sulphur and roasted in shallow pans, must be well stirred.

CASEIN PLASTICS

The transformation of casein gr[...] into plastic moulding powder is do[...] mastication under the influence of [...] and pressure in the presence of mois[...] with formaldehyde.

The mixing takes place in a do[...] mixer, and normally to 100 kilos [...] casein containing 10 per cent moist[...] are added 26 kilos of water. The wa[...] must be free from iron salts, and sho[...] either be freshly distilled or softe[...] For colouring purposes, where such [...] necessary, acid dyes are added, [...] these should be as fast to light [...] possible. The water is added to [...] mixer in the form of a spray, 15 minu[...] being occupied in the case of a cha[...] of the size indicated, and the mix[...] continued thereafter for an hour.

The mixture of casein, water, [...] is now ready for extrusion, an operat[...] performed in a horizontal screw ext[...]sion press consisting essentially o[...] 4-6 inches diameter revolving scr[...] fitted in a jacketted body with a fe[...] hole at the back end, and a hea[...] nozzle at the front. Over the feed h[...] is a hopper holding the moist case[...] with a simple stirring and feed-regul[...]ing device. The body of the machi[...] which surrounds the screw is fitted w[...] two separate jackets provided wi[...] steam and cold water supplies. At t[...] front of the screw a perforated st[...] grid is fitted behind a nozzle, which c[...] be changed to give various sized ro[...] or fitted with a mandrel to produ[...] tube,

For sheets two methods are used, the mixed coloured casein powder is spread in a suitably shaped mould and pressed, or the rods obtained by extrusion are cut into uniform lengths of suitable size; these are placed in moulds made of duralumin. The moulds are pressed in a multiple platen hydraulic press. The platens are heated to 180°-190°F and pressure of about 600 lbs per sq. in. applied for 3 minutes followed by application of full pressure upto 2 tons per sq. in. for a further 3 minutes. Cooling by water now follows, cold water being passed through the platens for another 6 minutes while the pressure is maintained. On removal from the press the sheets are soft, but quickly dry in the air and becomes hard.

DRY CELL.

There are a great number of dry cells on the market, but as they are all fundamentally similar so we shall merely describe the construction of one make.

We select as an example, the Siemen's dry cell which is one of the most satisfactory in the market. The positive element, which acts as the container, is of zinc, either cylindrical or rectangular, according to the shape of the cell, and is covered by a cardboard casing. The negative element is a carbon rod, surrounded by the depolariser in the form of a stiff paste composed of 53 per cent of manganese dioxide, 44 per cent of graphite, 2 of sal-ammoniac, 1 of gum tragacanth.

The operation is, however, performed in shaping the mass into a hollow cylinder by being forced through a die, so that the carbon is easily placed in position. The space between the depolariser and the zinc is filled with the exciter also in the form of a stiff paste consisting of 85 parts by weight of plaster of paris and 15 parts of flour, moistened with a saturated solution of sal-ammoniac. The bottom of the zinc vessel is coated on the inside by a thin layer of a bituminous compound on which is laid a diso of thick paper, thus preventing the possibility of internal short circuiting. An annulus of double canvas having a large mesh, is placed above the paste, and this in turn is covered with a layer of powdered cork with a piece of paper over it. The zinc container is protected and insulated by a closely fitted cardboard box having a thick base. This base extends higher than the zinc, which is entirely hidden by the bituminous seal. Contact is made with the zinc by means of an insulated copper wire soldered to it. Two small glass vent tubes are provided for the escape of gases. Contact with carbon is effected by the terminal screw fitted in a vertical hole drilled on the top of the carbon rod. This hole is enlarged at the bottom, and the screw is run in with an alloy of 2 parts of bismuth to one part of tin, which expands in solidifying.

CARBON ROD

Carbon rods can be made economically only by the use of expensive machinery and apparatus, such as pulverizing mills, hydraulic press and rectors or ovens but the amateur can make them with a little expense in the following manner. The materials required are wheat, coke, flour, molasses or syrup, and water. The tools consist of a moulds or tubes and piston for condensing the material in the tubes

and leaving to cool, and an iron mortar, or some other device, for reducing the cake to powder. Clean pieces of coke should be selected for the purpose, and such as contain no volatile matters are preferred.

Now pulverize the coke and pass through a fine sieve. Mix thoroughly with 1/5 to 1/6th its bulk of wheat flour, both being in a dry state. Next damp the mixture with a little water and keep the powder thus moistened in a closed vessel for 2 or 3 hours to prevent evaporation of the water. At the end of this time force the mixture through tubes by means of piston. Allow the rods to dry slowly at first, afterwards rapidly, in an ordinary oven at high temperature. When the rods are thoroughly dried they are packed in an iron box and completely surrounded by coke dust to exclude air and to prevent the combustion of the rods during carbonizing process.

Then close the box with a non-combustible cover and place it in a furnace to red heat. Keep cold, open the box and boil the rods for half an hour in syrup or molasses diluted with a little water. They are again basked in an ordinary oven and afterwards carbonized again. This latter process of boiling in syrup and recarbonizing is repeated until the required density is secured. As some gases are given off during carbonization, it is necessary to leave the box unsealed to allow these gases to escape.

TUNGSTEN WIRE FORMING COMPOUND

238 I.S.D., Bombay—Desires to be enlightened on the process of manufacturing tungsten wire forming compound.

12 g. of gallic acid are dissolved and boiled in 1 l. of water. To this solution 12 g. of very finely pulverised ammonium tungstate are added. An organic tungsten compound is immediately formed, that is, without any further addition of acid; this compound is present as a precipitate. This compound can be filtered and proves to have extremely high plastic properties. To the remaining solution approximately 5 cc. of diluted hydrochloric acid can be added, whereupon the remainder of the tungsten, which is approximately 1/4 of the total tungsten, will be precipitated in the form of a similarly highly plastic organic compound. In practice both operations can be combined, in which case the deposits can be filtered together. The precipitate is heated carefully in order to eliminate the greatest part of the water present therein.

Instead of ammonium tungstate, it is also possible to use other soluble compounds of tungstic acid, although the ammonium tungstate has proved to be the most suitable because of the high volatility of the ammonium radical. The concentration of the gallic acid solution may also be changed within narrow limits as long as the ratio between the gallic acid and the tungstate remains the same.

The organic tungsten compound obtained in this manner can be used for the manufacture of a large number of tungsten products. For instance, tungsten wires for illuminating purposes can be made by mixing finely pulverized tungsten with a suitable quantity of the organic tungsten compound, which has a considerably higher plasticity than the known tungsten compounds. Even when rather large amounts of tungsten powder are added (more than 100 g. can be used in connection with the above

mentioned quantities) a mass is obtained which is so plastic that it can be formed into fine wires without difficulties, and even at *low pressure* through the ordinary metal nozzles or glass nozzles. It is not only possible to make wires with this compound but it is also possible to produce bars that are hammered *and drawn, or even* tubes or hollow bars.

Besides the addition of finely pulverized tungsten, it is also possible to add other metals in the pulverized state, depending on the purpose for which the product is to be used; for instance, molybdenum, tantalum, thorium or the like may be added.

Chrome Tanning Sheepskins

292 J.L.M., Jaipur — Wants to know the process of chrome tanning of sheep skins.

For 800 lb pickled sheepskins, the following quantities are used:

Temperature, 110°F.

Water	50 gal.
Salt	50 lb.
Hydrochloric Acid	1 gal.

The goods should be drummed in this liquor for 30 minutes. At the end of that time, 58 lb of bicarbonate of soda dissolved in a small quantity of warm water, is added, together with 2¼ gal. of hydrochloric acid, and the temperature lowered to 94°F.

When yellow and thoroughly impregnated with chrome, which usually takes about two hours, the goods are horsed up for three hours so as to fix the chrome. They are then thrown into a paddle wheel containing 110 lb of "hypo" and 1 gal. of hydrochloric acid. After the wheel has been running 15 minutes, 4 gal. of hydrochloric acid diluted with 5 buckets of water, is run on slowly. At the end of one hour, 50 lb "hypo" and 2 gal. hydrochloric acid, diluted with 5 buckets of cold water, are added, and at the end of a further hour, 20 lb "hypo" and ½ gal. acid suitably diluted, added and allowed to work for two hours, then the goods drained and washed in cold water for 3½ hours (running water). They are always drummed in warm water, 100°F for 20 minutes before next morning.

No. 2

Per 100 lb Pelt:

Salt	10 lb
Sulphuric Acid	1 lb
Water	10 gal.

To this pickle is added (after *one or* two hours' running) a solution of 3 lb *bichromate, dissolved in a small quantity* of water. Drumming is continued for two hours, or until evenly chromed. A solution of 15 lb "hypo" 10 gal. of water is now added to the portions. There is really no need to neutralize the leather, but it must be thoroughly washed in running cold water. If goods are to be fatliquored, then neutralization is advised. Fat-liquoring should be carriel out with olive oil and olive oil soap emulsions.

No. 3

Salt	36 lb.
Sodium Dichromate	33 lb.
Water	36 gal.
Hydrochloric Acid	2¼ gal.
Sodium Thiosulphate	68 lb.

This is sufficient to tan 600 lb. pickled pelt.

PRINTING ROLLER COMPOSITION

351 T.G.I., Tiruchirappalli—Wants to know a good formula of printing roller composition.

Glue or gelatin	64	parts
Water	48	”
Linseed oil	96	”
Treacle	70	”
Calcium chloride	3	”
Powdered rosin	8	”

Soak the glue in the water and then liquefy by heat. Then stir in the oil first heated to 150°F. Then add the treacle and finally the rosin in melted condition. The latter ingredient is only to be added when very tough rollers are required. This recipe is interesting for the inclusion in it of hygroscopic salt calcium chloride, the object of which is obviously to keep the rollers moist.

PREPARATION OF PAPAIN

352 R.S.T., Madras—Wants to manufacture papain and rosin plaster.

The best method to manufacture papain is to collect the juice of unripe papaw by making shallow longitudinal incisions about $\frac{1}{8}$ inch deep in the well grown fruits, by means of a nonmetalic knife such as a bone or ebonite knife.

Fruits in which only three to four incisions are made simultaneously can be incised again after a day or two. The juice resembles a white thin sticky latex which coagulates rapidly.

The fruits should be incised in the early morning and the juice strained through muslin and dried at about 35°C for two days, when it forms a cream coloured brittle mass with an unpleasant odour. The mass can be ground to a powder.

The juice should be collected in glazed earthenware and a trace of formalin added to the juice which will prevent decomposition. Small quantities of juice may be dried in the sun on sheets of glass. Large quantities however are prepared preferably by spreading the juice in linen trays made by stretching brown linen on wooden frames placed over a hot air chamber of bricks avoiding excessive heat. For this purpose an iron plate covered with 2 to 3 inches of sand between the fire and the hot air chamber of bricks avoiding excessive heat. For this purpose an iron plate covered with 2 to 3 inches of sand between the fire and the hot air chamber may be used with the trays about one foot above the plate.

Artificial drying in the way should be done below 100°C. On a large scale however, vacuum drying would be found to be very efficient. The juice contracts in drying and the contents of several trays can be placed subsequently in one to complete the drying. The juice should be dried till it is crisp and capable of being reduced to a powder. A cream coloured or white powder is obtained. The yield of crude dried material amounts to about 16 to 18 per cent of the weights of the juice.

After drying the mass is ground, while still warm in a stone mortar with a stone pestle. The crude product is a white amorphous powder. In order to purify this impure substance, it is treated with a sufficient quantity of absolute alcohol and it is found that about 75 per cent of the crude mass is dissolved in it. It is then filtered and the filtrate on evaporation gives rise to pure substance; which can be used again.

ROSIN PLASTER

To prepare rosin plaster first prepare lead plaster in the following manner:

Litharge	6 lbs.
Olive oil	1 gallon
Water	1 quart.

Boil all together on a slow fire, constantly stirring to the consistence of a plaster, adding a little boiling water if nearly the whole of that used in the beginning should be consumed before end of the process.

Now take 3 lbs of this lead plaster. Warm it and then to this melted mass add rosin in fine powder, ½ lb also liquefied by gentle heat and mix.

TIN PRINTING

375 B.R.L., Kanpur—Desires to be enlightened on the process of tin printing.

The modern method of printing upon tinned plates is an application of offset printing. The printing machines may belong to either built for this special purpose and have their the flat-bed or the rotary type, but they have own characteristics. The tinned plate, does not actually come in contact with the printing surface; but as it is carried round with the cylinder into which it is fed, it receives an offset impression from a rubber blanket fixed upon a second cylinder, which has already taken a direct print from the printing surface. As the plates are printed they are arranged in racks and kept aside to dry or they may be put into a stone for forced drying.

Before printing, each plate should be thoroughly rubbed on both sides with a duster to remove dirt, grease, etc., which may perchance have got upon it, and which if left, would prevent the ink from printing. Rough edges must also be smoother, as otherwise the rubber blanket would soon be damaged.

The method usually adopted is the same as that of printing paper. The white would be done first, would cover up all parts except those required to appear as gold and silver, or any parts in which a colour is required to appear with a lustre. Of course, only transparent yellow lacquer is nsually printed after the white; it produces a nice strong buff where it falls upon the white, and a bright gold where it comes upon the bare tin. It may, however, be had of various shades to suit special requirements. It helps to give depth of colour and brilliancy to solid reds and other colours. It is an important matter for the artist when drawing the design to take full advantage of the light colours. The black printing would come next, followed by the red and the blue. After the work has dried, the plates are varnished and then stoved, after which they are ready for the tin box workers.

As with ordinary offset printing the rubber blanket will require to be washed several times during the day. This should be done with a very volatile liquid such as solvent naphtha, spirits of turpentine, or benzoline, and it should be immediately afterwards dusted over with fine flour of sulphur. This treatment will impart to the rubber a fine printing surface.

All designs to be printed on tin should be especially lithographed by an artist with experience of tin plate work. Type matter must be reserved.

Reader's Business Problems

[Reader's business problems will be discussed in these pages. We invite the reader to write us his difficulties. As the department is in charge of an experienced businessman who is specially adept in dealing with such problems and to whom experiences of a large number of successful businessmen are available, his replies will lead the enquirer to a successful career. These replies will be published in the paper only and cannot be communicated by post.]

ADVERTISING AGENCY

949 K.K., Bombay—I wish to begin the business of an advertising agent. Can this be a profitable business in this part of the country? How to proceed on?

Answer:— Advertising is a development of the Advertising Agency and the Advertising Agency is a development of Advertising. The so-called Advertising Agency is respon·ible for the development of modern advertising as an art and as a business. Thus Agency is the link between the advertiser and the publisher. It has blazed the way for the producer to the customer. It has pointed out the way to larger markets.

What are the function of the Advertising Agency? It is the business of the Agency to expand the appropriation of an advertiser in such, a way so as to secure for him the largest possible returns from the expenditure. The Agency can buy space in a newspaper cheaper than others because the man who gives a magazine ten pages of advertising in one month can naturally buy space cheaper than others. It is then in a position to demand concession and it gets it.

Having selected the proper mediums, the Agency acquaints itself with the business of its clients. Studying the product and the selling organisation, the agency can plan an advertising campaign based upon the information adduced; and the most important feature of this campaign should be the preparation of the "copy" for its design must be attractive.

Considering the services rendered by the agency, it is regarded as an indispensable vi,-media between the producers and consumers in the modern world and Bombay is the proper place where such an agency may profitably work.

This service is going to be marred by two tendencies. Firstly the "Coupon System" is taking deep root whereby the plates are prepared for an entire year and secondly a tendency to take on too many clients, thereby making efficient individual service impossible.

So, we sound the note of warning to our reader in this connection. His clients may be less than others but he should never neglect them. The advertisement of his own efficiently is steady service and individual care. By this way his name will spread soon far and near and his business will also thrive with the similar pace.

STARTING A BOOK SHOP

407 P.C.D., Lucknow—Writes, I wish to start a book shop on a small scale say with Rs. 2,000 in any town. I shall be highly obliged if you advise me properly so that I may be successful in my business.

In the beginning Rs. 2,000 will be a reasonable start. It will grow steadily as business improves. In the beginning it should as far as possible be worked single handed till your business demands another helper. The book shop should be situated on a thoroughfare preferably in the vicinity of schools and colleges.

Book cases and almirahs should be decent and up-to-date. You should read the reviews

in dailies, weeklies and monthlies and stock such books in small number as may be systematically increased according to the public demand for them. Always remember the name of book for which enquiry has been made. The price should be fixed to the minimum percentage over the cost, say from 6¼ to 12½ per cent.

When an author has made a name pretty well anything written by him will sell and should be given a front place. Don't stock books just because you think they ought to be sold or because you admire the author yourself, your customer may not be upto your level and in any way your business is to sell them books but not to educate them. Gauge taste of your public but don't let them see you doing it. Be topical and notice the signs of the line and be in advance of the season. Watch the books and book novelties of the season and take full advantage of the line and put them in a prominent place where enthusiastics may see and possibly buy. Don't be afraid of taking a little trouble with your customer. If you have not the particular books asked for in your stock, order them without demur, and get them in promptly. Don't mind answering apparently useless questions. They may lead to business when you least expect it, and always be ready to advise when some one comes in with such a remark as "I want a book for a delicate boy of twelve". Do not hesitate but bring out some book suitable at once. Of course it will take ingenuity, but that is only a part of your business. Some young men at book shop are excessively superior and somewhat forbidding. They make the mere purchaser think that he is guilty of an impertinence in the symmetry of the book case by removing a book from it. Don't imitate those excessively superior young men. Always look pleasant whatever you may feel.

PURCHASE AND SALE OF PADDY

100 J.K.B., Dubrajpur.—I live in a place which has a local hat in which paddy grown in different parts of the district, which is rich in its annual yield of paddy, is brought and sold by the cultivators. I find many outsiders, including the omnipresent Marwari, coming here and purchasing the commodity. Do you advise me to follow their example ?

ANSWER:—Most decidedly. Why should you allow the Marwari or any outsider to steal a march over you by dealing in the products of your own district ? Before purchasing, however, we would advise you to provide yourself with a suitable granary where you might store your purchase safely so as to prevent it from being wasted in any way. That done, you might proceed to the purchase of paddy just after it is reaped and brought to the hats for sale. We might safely tell you that you need not wait indefinitely during the season for the price to reach the "lowest possible level". You are sure to lose many golden opportunities by acting in that way. Start buying from the very beginning of the season (according to the length of your purse), and even if you have to pay somewhat higher rates in the beginning you will not find yourself to be a loser in the long run. There is no knowing when prices begin to go up, and the changes are that by waiting indefinitely for the lowest level, you might be ultimately compelled either to forego buying altogether in that particular season, or to buy when prices are soaring merrily upwards. The main thing in these cases is to see that your purchase is safely stored and duly weighed. Try to be present personally when effecting the purchase. You need not worry about the sale. If you like, can dispose of your stock when prices go up, locally to the mahajan who goes about from village to village with gunny bags for purchasing the commodity, or can arrange for its sale in Calcutta.

Queries and Replies

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of Re. 1 stamps for each question. Subscribers outside India are requested to send eight International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

471 N.R.D., Rangoon—Following is a formula of cod liver oil emulsion: Calcium hypophosphite 80 grains; sodium hypophosphite 120 grains; sodium chloride 60 grains; gum acacia in powder 2 oz; elixir of glucoside 20 minims; essential oil of almonds 15 minims; glycerine 2 fl. oz.; codliver oil 8fl. oz.; distilled water to produce 16 fl. oz.

474 L.M.S., Chinsurah—Following is a list of jewellers: B.B. Sirkar Company Ltd.. 160-1,Bowbazar Street; Ghosh Brothers, 114, College Street; Rakhal Chandra Dey, 121, Bowbazar Street; P.C. Chander & Sons, 127/1A, Bowbazar Street; Satish Mukherjee & Sons, 84, Bowbazar Street and P.C. Auddya, 125B, Bowbazar Street; all of Calcutta.

475 S.J.S., There is no such institution where manufacture of sugar and jaggery is tought on cottage industry basis. You may however negotiate with the All India Village Industries Association, Maganwadi, Wardha, M.P. We have no book on the manufacture of sugar and molasses and cultivation of betel leaves.

476 F.R.Q.. Karachi—We have no book dealing with tea treacle and tea blending.

478 R.N.G., Ujjain—Sodium sulphide is not manufactured in India at present. You may however write to Imperial Chemical Industries (India) Ltd., Chowringhee, Calcutta.

480 F.I.P.O., Calcutta—Following is a process of deodorising kerosene oil. Kerosene oil 1 gallon; chloride of lime 3 oz.; slaked lime 2 oz.; hydrochloric acid q.s. Mix the chloride of lime with the oil and add hydrochloric acid until chlorine gas leaves to be given off, mixing thoroughly. Then pour on to the slaked lime contained in another vessel and allow it to remain a couple of days. Then well mix up. Allow the lime to subside. and draw off the petroleum.

482 F.I.F., Gauhati—Following is a formula of tea flavour: Rose oil 4 drops; Neroli oil 34 drops; Cognac oil 200 drops; Lemon oil 2½ oz.; Vanillin 5 oz.; Benzyl acetate 5 oz.; Ethyl formate 1 lb.; Amyl lentyrate 2 lbs.; Ethyl acetate 3 lbs. Mix and keep in stoppered bottle for use.

484 B.R.F., Jamshedpur—Castor oil as obtained by cold expression is a withish oily liquid possessing strong acid odour. To remove this bad smell and at the same time to refine it the process is given as follows: Transfer the oil to a clean iron boiler supplied with considerable quantity of water. Boil the mixture for some time and skim off the impurities as they rise to the surface. a clear oil is at length left upon the top of the water, the large and starch having been dissolved by this liquid and the albumen coagulated by the heat. The latter ingredient form a whitish layer between the oil and the water. The clear oil is now carefully removed, and the process is completed by boiling with a minute proportion of water and continuing the application of heat until aqueous vapour ceases to rise and until a small portion of the liquid taken out continues perfectly transparent when it cools. The effect of this last operation is to clarify the oil, and to render it less irritating by driving off the acid volatile matter. But much care is required to carry out this operation so that not to push the heat too far, as the oil then acquires a brownish hue and an acid peppery taste. After the completion of the process put the oil into barrels and send to the market for sale.

485 A.K.D., Calcutta—Sweet oil, almond oil, etc, may be had of F.N. Sarker, 87, Canning

Street; Ghose Brothers, 50 Ezra Street; Paradise Perfumery House, 7, Colootola Street and Clive Medical Hall, 8, Ezra Street; all of Calcutta.

488 B., Jalpaiguri—Hosiery machines may be had of Dawn & Co., 11, Portuguese Church Street; Knitting Machine Syndicate, [illegible], Waterloo Street and W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar Street; all of Calcutta.

490 T.A., Rajahmundry—Gun for pressing glass is not available with us. We do not deal in any articles; we only supply information. For glass press gun enquire of Behary Lal Dey, 9, Swallow Lane and Fatic Lal Seal & Sons, 10, Swallow Lane; both of Calcutta.

493 Y.M.Co., Nasik City—Following is a recipe of iron cement: Iron filing 33 oz.; Ferrous sulphate 17oz.; Vinegar 50 oz.

494 S.M., Jeypore—Following is a list of aluminium factories: Aluminium Corporation of India Ltd., 9, Netaji Subhas Road; Aluminium Manufacturing Co. Ltd., 4, Fairlie Place and Aluminium Production Co. of India Ltd., 31, Chowringhee Road; all of Calcutta. Aluminium working machine may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

495 B.S.P., Jullundur City—Process of manufacturing all kinds of soap will be found in Manufacture of Soap published from this office, price Rs. 4/12/- including postage. You may boil the oil with equal quantity of water. When water soluble impurities will dissolve and settle at the bottom. Decant the oil very carefully. The oil thus obtained may be used in manufacturing soap. Following is a formula of insect spray: Petroleum spirit 35 fl. oz.; Pyrethrum extract 7 dr.; DDT solution 5 dr.; Citronella oil 3 oz.; Methyl salicylate 5 dr. [illegible] Following is a formula of mosquito repelling oil: Cedar oil 2 fl. oz.; Citronella oil [illegible] oz.; Spirits of camphor 8 fl. oz. Mix in a dry bottle, and the oil is ready for use. This preparation may be smeared on skin as often as is necessary to repel mosquito and other insects.

[illegible] N.C., Lingvour—Following is a formula of tooth powder: Precipitated chalk 35 parts; Magnesium carbonate 25 parts; Borax 14½ parts; Sodium bicarbonate 14 parts; Soap, powdered 4 parts; Sugar, powdered 7½ parts; Methyl salicylate ⅜ part; Menthol 1/10 part; Cinnamon oil 1/5 part. Dissolve the menthol in the methyl salicylate, add the cinnamon oil and then add to borax and mix with sugar. Add to the other ingredients; mix and sift. To prepare camphor cakes or tablets, moisten the camphor crystals with alcohol by spraying; then put in moulds and compress. By this means the camphor will form into blocks. On exposure to air the alcohol will volatilise leaving aside camphor in the form of blocks. Borneol is a chemical which forms the basis of manufacturing synthetic camphor. Rosin and benzine are quite different matter. Essence may be had of Paradise Perfumery House, 7, Colootola Street, Calcutta. You may take up manufacture of tooth powder with Rs. 500/- on a very small scale.

499 M.P., Kumerdhubi—To communicate with any querist write him with number and initials care of Industry, when your letters will be redirected.

502 S.A.S., Rampur—The piece of cloth sent by you is not printed but embroidered, that is knitted by means of machine.

504 L.P.S., Secunderabad—Silk sarees may be had of The Deccan Cloth House, Abib Road, Hyderabad; N. Narsimlu, Sultan Bazar, Hyderabad and B. Venkiah, Kingsway, Secunderabad, Hyderabad.

507 N.F., Madurali—Transfer labels may be had of Signograph Co., Barnagore, Calcutta.

508 K.V.R., Seetarampuram—Fats are removed from bones. The fat extracted bones are then reduced to powder by means of ball mill or by a disintegrator.

509 K.B.S., Faridabad—Wants to be put in touch with the suppliers of leather washers suitable for kerosene oil pressure stoves.

510 R.R.B., New Delhi—Skimmed milk may be utilised in manufacturing casein. Process of manufacturing casein will be found in Milk and Milk Products published from this office, price Rs. 3/12/- including postage. You

[illegible] which may be had of Edward Keventer Ltd., 11/3, Lindsay Street, Calcutta and Volkart Bros., 8, Netaji Subhas Road, Calcutta.

511 B.N.C., Ranchi—Aluminium melts 1220°F. Detailed process of casting will be found in Practical Metal Casting by B. Dey, published from this office. price Rs. 3/12/- including postage.

514 S.B., Calcutta—Process of manufacturing hair oil, nail polish, face powder, etc. will be found in Indian Perfumes Essences and Hair Oils published from this office, price Rs. 5/12/- including postage. Formulas of above products regularly appear in the columns of our magazine. If you read our magazine regularly you will find all the formulas required by you.

516 T.M.J.D.S., Hyderabad—Following is the process of making culinary vinegar. Vinegar as prepared from the fruits can be suitably spiced with chilli, black pepper. onion. celery seed, caraway, etc., either alone or in suitable combination. In making vinegar with spices it is usual to steep one ounce of the respective article in vinegar for 14 days, and to strain after the expiry of the period. When vinegar of mint and other leaves is to be prepared, steep 2 to 3 oz. of leaves of each variety in vinegar. Shake frequently and strain after 14 days. Then bottle. Following is the process of preparing table vinegar. Coarsely powder the following ingredients: Aniseed 5 parts; Caraway seed 2/5 part; Fennel and coriander seed each ½ part. Pour 5 parts of alcohol and 45 parts of good strong vinegar over the powders, close the flask hermetically, and let the whole digest in a warm place for 6 to 8 days, shaking frequently. Then strain the liquid off, press out the residue, filter the vinegar and put up in bottles.

517 L.C.W., Vijayawada—Following is a formula of liquid gum: Gum acacia 20 lbs.; Water 5 gals.; Glycerine 7 lbs.; Perfume 4 oz.; Formalin 2 oz. Simmer the gum in the water until dissolved, and the glycerine towards the end, stirring in well. Then cool and stir formalin.

518 S.I., Madras—Carat gold is not pure gold but an alloy. Gold of 22 carats is fine as pure gold. Gold 18 carats [illegible] penny weights; Silver [illegible] grains; copper 2 penny weights [illegible] another formula of 18 carats is gold [illegible] weights; Silver 1 penny weight 18 [illegible] Copper three penny weights 6 grains.

521 I.S., Jorhat—We do not deal in any article. We furnish information to our readers. Shellac may be had of Angelo Brothers Ltd., 6, Lyons Range, Calcutta; D. Mukherjee & Co., 156, Radhabazar Street, Calcutta and Coast India Trading Co., 2, Church Lane, Calcutta.

522 H.R.T., Kanpur—Carnauba wax may be had of Calcutta Chemical Co. Ltd., 35, Bonfield Lane and Banshidhar Dutt, 135, Khengrapatty Street; both of Calcutta.

523 S.F.R., Orai—Manufacture of Soap published from this office contains process of manufacturing all kinds of soap, manufacturing glycerine from waste lye, etc. It will be of much help for you. But you should engage some expert mistri for boiling soap before starting the factory.

524 P.B.N., Undugoda—Following is a formula of cheap washing soap: Coconut oil 20 lbs.; Caustic soda lye 38°Be 15 lbs.; Soda ash 5 lbs.; Soda silicate 8 lbs.; Water 40 lbs. Mix the entire lye in the oil all at once and let it stand for half an hour. Now place it over a fire and commence boiling it with the addition of the entire quantity of water. The boiling mixes up the oil and the lye but the soda ash and the silicate in their natural condition and stir thoroughly while the soap is being formed. This will be a better variety of such kind of cheap soaps.

525 A.R.W., Kapurthala—Process of making gut will appear in due course.

527 F., Karachi—Process of making incandescent mantles will appear in due course.

529 S.M.C., Chaibasa—Process of manufacturing starch will be found in Utilisation of Common Products published from this office, price Rs. 3/12/- including postage. Process of manufacturing ultramarine blue will be found in Chemical Industries in India published from this office, price Rs. 3/12/- including

postage. We have no book dealing with the manufacture of distemper. Process of manufacturing distemper will appear in due course.

531. R.P.N., Arantangi—In manufacturing soap coconut oil and cotton seed oils are used. We do not understand what you mean by double distilled coconut fatty acid or cotton-seed fatty acid.

530 K.C.P., Kunnankulam—Crown cork making machine may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road; Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension and Francis Klein & Co., Ltd., 1, Royal Exchange Place; all of Calcutta.

532 R.L.P., Allahabad—Following is a formula of chalk crayon: Precipitated chalk 40 parts; Plaster of paris 45 parts; Lithopone 10 parts; Glue solution 5.10 parts. Knead all together to make a soft dough and pour into gun metal moulds. When set take out and allow to dry in air. Then put all together in a tray and moderately bake over mild fire.

534 R.P.S., Lahore—Following is a formula of lanolin face cream: Lanolin creams make an excellent skin emollient. They generally consist of hydrous lanolin to which has been added a fixed oil and some glycerine. They should be well perfumed. Hydrous lanolin 800 parts; Almond oil 100 parts; Glycerine 80 parts; Benzoic acid 2 parts; Coumarin 5 parts; Musk ketone 1 part; Linalol 2 parts; Terpineol 3 parts; Amber liquid 4 parts. Melt the lanolin on a water bath and add the oils and glycerine. Stir until of uniform consistency, and when cool add the perfumes which has been previously mixed.

536 B.S.C.W., Jharia — For securing service of an expert you should advertise in daily paper. We are not aware of any expert who will help in manufacturing pitch and sealiar.

537 L.J.M., Colombo — For jeweller's enamel paint write to Hamilton & Co. Ltd., 8, Old Court House Street, Calcutta.

538 M.G.R., Vijayawada—As you intend to manufacture beedi on large scale so that you may earn Rs. 1,000/- in a month it will help you to start the business. Beedi leaves and tobacco may be had of Bhailal Bhikhabhai & Co., 10-1, Lower Chitpur Road and Mooljee & Co., 51, Ezra Street; both of Calcutta. In this connection you may also consult Indian Tobacco and Its Preparation published from this office, price Rs. 3/12/- including postage.

539 P.N., Guntur—For testing red powder you may negotiate with the Superintendent, The Govt. Test House, Alipur, Calcutta and R. V. Briggs & Co. Ltd., 3 & 4, Garstin Place, Calcutta.

543 V.C.L., Tiruchirapalli Cantt.—A good formula of gramophone record composition will appear in due course.

544 U.T.C., Sumatra—Homeopathic medicine may be had of C. Ringer & Co., Norton Bldgs. Lall Bazar, Calcutta; Dhar Roy & Co., 80, Netaji Subhas Road, Calcutta; Sett Dey & Co., 40A, Strand Road, Calcutta and S. K. Ray & Co., 9, Bonfield Lane, Calcutta. Following is a list of homoeopathic colleges: Bengal Allen Homeopathic Medical College & Hospital, 169, Bowbazar Street and Calcutta Homeopathic Medical College Hospital, 265 & 266, Upper Circular Road, Calcutta.

548 P.I.C., Dacca—Following is a recipe of impregnating solution for mantles: Thorium nitrate 1000 parts; Cerium nitrate 10 parts; Magnesium nitrate 1½ parts; Beryllium nitrate 5 parts; Distilled water 2000 parts. Mix. The time of impregnation of the artificial silk mantles varies from about 2 minutes to about 15 minutes according to the nature of artificial silk.

551 M.M.P., Rangoon—We are not aware of any expert who will be able to work as a chemist in your printing ink factory. You better advertise in newspapers.

553 K.S.K.R., Bangalore — You better consult a chemical engineer for helping you in erecting plants and equipments for chemical industries.

554 B.P.S., Kanpur—We are not aware of any address of lottery ticket sellers. For Derby ticket you may enquire of Royal Calcutta Truf Club, 11, Russel Street, Calcutta.

556 F.C., Kanpur—For dies and punches you may enquire of Small Machineries Manufacturing Co., 22, R. G. Kar Road, Calcutta; Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta and Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

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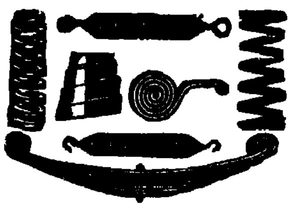
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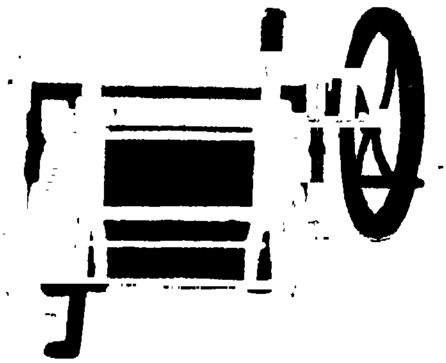
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MONTHLY MAGAZINE

FORTY FIFTH YEAR OF PUBLICATION

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INDUSTRY

A Monthly Magazine for Manufacturers and Businessmen.

Editor: K. N. Banerjee.

Published in the first week of the month by

INDUSTRY PUBLISHERS LTD.,

22, R. G. Kar Road, Calcutta 4.

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Contents For February Issue.

February issue of Industry will contain many useful articles on commercial and industrial subjects such as Manufacture of Abrasive Paper and Cloth; Manufacture of Paints: Canning Vegetables, etc. in addition to the regular features such as Agricultural Tips; Scientific Researches and Inventions; Pharmaceutical Recipes; Recipes for Small Manufacturers; Formulas, Processes and Answers; Readers Business Problems; Queries and Replies. etc.

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All enquiries regarding industrial or business information should be addressed to the Editor. Contributions and articles for review and notice should also be sent to him.

All enquiries regarding the Subscription or Advertisement Departments should be addressed to the General Manager.

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11 A.M. to 2 P.M. on Saturdays

Subscription and Advertisement Department 10 A.M. to 5 P.M. on weekdays and 10 A.M. to 2 P.M. on Saturdays.

Industry
...E FOR MANUFACTURERS & BUSINESSMEN

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OVERCOMING OBSTACLES

FEW of us can go through life without having to overcome some obstacle—but that is the only way in which a man can prove to himself his ability to face difficulties squarely and to rise above his circumstances.

What many regard as obstacles are not really obstacles at all. They are merely conditions in which a person finds himself, and it then becomes a matter of the individual adapting himself to new conditions.

To some of us obstacles are stepping-stones: to others they are stumbling-blocks. It all depends on how you look at them, and in what attitude of mind you are prepared to face them.

Each of us had some education, and it does not follow that the man who has an extensive training is better equipped to face the world the man who has fought his way to the top although hampered considerably by circumstances.

Often such men were taken away from school at a very early age and put to hard work without a chance of continuing their general education. Yet many of these men have through perserverance and practice acquired a good knowledge of the subjects on which they were most weak, and have risen to heights of eminence through their own determination.

Lack of education should not be regarded as a hindrance but as an incentive. We all have to learn. What we learn, and how we learn, is entirely dependent upon ourselves.

If we give our mind to it we can equip ourselves with considerable knowledge of an ordinary subject in six months, and a more difficult subject in the course of a year or two. But only if we give our mind to it.

It is not a bit of use looking for an easy way out in life. There may be a short cut to the keenly observant, but there is no royal road.

There is only one way to which any deficiency can be made good—and that is first of all to realize what the deficiency is, and secondly, to be determined to overcome it.

If we allow ourselves to rest satisfied with our present position then we have only ourselves to blame if the fates seem unkind to us.

No one has the right to demand more from life than he puts into it.

He can only expect more when he is worth more, and he can only earn more if he will learn more. Once he realizes the significance of this it may provide the impetus to enable him to go ahead and make up for lost time.

Concerning lack of opportunity, there is no lack of opportunity but there is a great lack of people who can seize an opportunity when it comes.

The world is full of well-meaning people who constantly bemoan that opportunity never knocks. It is constantly knocking but few are sufficiently concerned to answer the door.

Almost every day some opportunity for advancement, or for the acquirement of some new interest occurs, but, as opportunity frequently means responsibility, it has not quite the same romantic ring about it.

Lack of capital is not as big a stumbling-block as some people imagine. Capital alone will not build a business or save a situation. The business with the largest capital is not necessarily the largest business.

It will generally be found that the discontented worker is also discontented with things apart from his work. He is the hardest person to please. Quite frequently he does not know what he wants. Instead he prefers to nurse a grievance—often an imaginary grievance—which in itself prevents him finding contentment in his work or in other interests apart from his work.

In such circumstances a man may feel that if only he had the requisite capital which would enable him to give up his present position and start in business for himself he would at last find complete freedom from worry. But that is just where he is wrong. If he decided to take that risk he would probably find that he had more worries than ever to cope with.

That is not [illegible] really needs is, first of all, to [illegible] himself and, secondly, to [illegible] success and happiness really mean.

The capital which we need takes the form of confidence and courage, patience and perseverance, and—ambition. Equipped with these a man is able to travel far and enjoy the journey.

It is not a bit of use bemoaning financial difficulties, complaining that they hinder progress. Work steadily on. Work with a will, and if you are conscientious and keen you will gradually accumulate your savings.

Don't strive to hide whatever talents you possess. The feeling that you can't do things generally results in not even attempting to do them.

Perseverance is one of the assets we should hang on to for all we are worth. It helps a man to overcome the most formidable obstacle in his life.

The man who perseveres is not frustrated by failure. He just takes off his coat, or sticks his jaw out a little further, and is more determined than ever not to be beaten.

Such a man has in him something of the fighting spirit of the finest pioneers. He does not flinch but goes forward.

He does not retreat when he comes to an obstacle. He does not even go round it. He meets it face to face and then prepares himself to get on top of it and arrive safely on the other side.

And if he fails? "My greatest successes were failures," a successful man once remarked. "They taught me lessons I should never otherwise have learnt. They made my struggles harder but keener. Each set-back inspired me with a greater zest for victory."

When your next obstacle comes—welcome it. Don't run away from it. Run up to it and over it!

That obstacle that has long remained an obsession to you: don't funk it—[illegible]

PROBLEM OF UNEMPLOYMENT IN W. BENGAL

Very interesting data on the employment situation in West Bengal are now available in the Report on Survey of Unemployment in West Bengal, Volume II, Part I, which has just been published. The survey was undertaken at the instance of the State Government in order to have reliable statistics for the formulation of policies for tackling the problem.

According to the survey, in Calcutta there are 215.2(000) persons who have no employment whatsoever. The number of employment seekers who never had any employment is 145.2(000) majority of these belonging to the age group 16 to 30 years.

Among the persons who have full-time employment about 63 per cent are domiciled in West Bengal, 34 per cent in other Indian States and 3 per cent in countries other than India.

73.4 per cent of the persons employed full time have monthly income of Re. 1-100; 17.2 per cent of Rs. 101-200, 4.8 per cent of Rs. 201-350, and only 3.5 per cent of more than Rs. 350|-.

The number of persons who neither have any employment nor are seeking is 1,468(000), of whom 548.6(000) are males and 919.4(000) are females. Most of these males are either below or above the employable age group.

SILVER RECOVERY PLANT

A silver recovery plant, the only one of its kind in India to produce refined silver from indigenous ores, has been set up by the Metal Corporation of India, at Tundoo, near Katrasgarh and is operating since March 1954. Under the present process, silver is being obtained from the [illegible] lead concentrates produced at the Zawar mines Udaipur, (Rajasthan) at the company's smelter. The process consists essentially of melting the rich retort lead bullion and exposing it to a blast of air by which the lead and the base metals are oxidised and slagged off in the form of lead slag, commonly known as "cupel lithrage" etc.

Through the prescribed process impurities are completely slagged off and removed from the molten bath, which essentially make pure silver of 997 purity and casted into bars of 1000, 1001 Troy ounces. The three parts of impurities consists mainly of lead, copper, zinc and gold, the latter exists to the extent of 5 ounces per ton of silver, which is at present not recoverable; but when the production would increase this small amount of gold could be so processed as to pay for itself.

The present capacity of the silver plant is approximately 30,000 Troy ounces per month. So far the Corporation has produced till the 31st. of December '54 approximately 1,41,232,00 troy ounces or 3,77,089. 44 tolas of refined M. G. silver; a savings in the country's economy in terms of Foreign Exchange, it is said.

NATURAL RESOURCES OF RAJASTHAN

Rajasthan's Chief Minister, Sri Mohonlalji Sukhadia, invited enterprising individuals and organisations to go to Rajasthan and exploit excellent natural resources, thus helping one of the backward areas of India to develop. He was speaking at a press conference in Calcutta recently.

Rajasthan of 1,52,97,979 inhabitan in an area of 1,30,207 sq. miles, he said had now as much security of life and property of the citizens as anywhere else in India. The records of the mineral production of

Rajasthan indicated beyond doubt that it was one of the principal mineral producing States of the Union. There were more than 2,000 mines and quarries distributed practically in all the five divisions. Lead, zinc and silver deposits at Jawar near Udaipur had recently come into lime-light. Manganese Ores had been located in the Banswara District of the State, Rajasthan was probably the richest producer of the important atomic mineral of Beryl. Substantial quantity of good quality copper ores had been found in Khetri and Alwar regions. Other important minerals as Asbestos, Tungeston, Bentonite, Soapstone, etc. were also available.

The Chief Minister assured that the Government would provide necessary facilities and opportunities in all who might come in consonance of All-India policy.

He regretted that apart from the various political and administrative problems which cropped up as the natural consequence of the process on integration of a number of more or less semi-independent states, the lack of any systematic economic survey had been a great handicap in formulation of a programme of economic development. The paucity of technical personnel and inadequacy of financial resources had been other limiting factors.

He asserted that Rajasthan had got to be exploited. He outlined steps taken by the Government under the First Five-Year Plan as also the proposals under the second Five-Year Plan and hoped that Rajasthan's progress towards development would be an unhampered one.

THE SECOND RAILWAY FIVE YEAR PLAN

The second Railway Five Year Plan, it is reliably learnt, will cost Rs. 800 crores against the current plan of half this amount.

It is based on the broad ... that about 3,000 miles of new lines will ... laid and the existing line capacity will ... augmented to the extent of 50% over a... above the capacity that will be availab... at the end of the current financial year ... the arterial and other important main li... sections.

Augmentation of the capacity will ... achieved by doubling and by constructi... additional cross-sections and loop-lin... as well as by remodelling yards a... terminal sheds. The plan also aims ... securing rolling stock and developi... workshops and running shed repai... capacity on the basis of a 25% increa... over the next five-year period.

The policy of increasing amenities f... railway users and staff quarters w... continue to be implemented. These bro... aims are reflected in the tentative figur... of expenditure; Rolling stock a... machines Rs. 319 crores; new lines a... restorations Rs. 195 crores; line capaci... works Rs. 77 crores; the Ganga Brid... Rs. 10 crores; electrification of Calcut... railway Rs. 10 crores; safety works Rs. ... crores; operating improvements Rs. ... crores; other miscellaneous projects Rs. ... crores; amenities for users of railw... transport Rs. 15 crores; and staff welfa... works and staff quarters Rs. 35 crores.

Detailed planning in each sector ... the railway plan has still to be unde... taken. A planning organization has be... set up in the Railway Board Office. ... will work in close collaboration with ea... regional railway. Only at a later sta... will it be possible to indicate precise... how the cost of the plan will be shar... by each railway. An effort will, howev... be made to spread it evenly among the...

According to the provisional pla... new lines will be distributed among ... railways as follows: Southern 394 mil... Eastern 502 miles; North-Eastern 5... miles; Northern 340 miles; Western ... miles, and Central 316 miles.

[illegible] OF HUSKED RICE

The Government of India has decided to permit export of husked rice from all ports in India, it is officially announced.

So far, since July 24 last, export of husked rice was being permitted from the ports of Bombay and Calcutta only. Simultaneously, government also announced recently reduction in the export duty on rice from 20% ad valorem to 2 annas 3 pies per maund.

CENTRAL PLAN FOR INDUSTRIES

A comprehensive programme for the ecnouragement and development of small-scale industries for 1955-56 has been drawn up by the Small-scale Industries Board of the Governmet of India.

Although no definition of a small-scale industry has been laid down by the Board, it has been decided that, for the purpose of loans, a unit with capital assets of less than Rs. 5,00,000 and employing less than 50 workers with power or 100 persons without it, will constitute a small-scale industry.

A proposal for the setting up of five industrial estates has been approved by the Board. These estates will develop land, construction work-shops and other buildings required by small units, arrange for the supply of electricity, water, gas, steam, compressed air, and other facilities, and provide community services. Around each estate, a number of small-scale industrial units are expected to be established.

It has also been pointed out by the Board that in areas where electricity rates are high attempts should be made to introduce new tariff for the supply of power to small-scale units and to frame a co-ordinated programme whereby large-scale factories will decentralize their operations and offer work to different small-scale units within easy reach.

Under the programme, [illegible] work-shops will be set up by the Central Government to introduce improved tools and techniques in widely diversified industries, such as carpentry, [illegible] work, pottery, leather flaying and tanning and the manufacture of leather goods. State Governments will prepare schemes for the starting of these workshops according to local needs.

It has also been decided that a number of industries, such as furniture making, footwear, sports goods, glassware, cutlery, locks and cycle parts, which operate in groups in different towns, should be selected and given assistance to improve the quality of their products, reduce costs, introduce new designs and to encourage production along new lines.

The Board, after considering a number of industries whose manufacturing capacity is still undeveloped, has decidad that a central organization should be set up for each group of industries. These will arrange for land and buildings and the supply of equipment and raw materials on credit so that new lines of manufacture may be introduced. It is estimated, that 45 such groups will be developed during 1955-56. Industrigs to be so developed include surgical instruments, mechanical toys, clocks, laboratory and scientific equipment, knitting needles, thermos flasks, cigarette lighters and fountain pens.

As small-scale industrial units have not obtained material financial assistance due to various rules regarding security, the Central Government has been advising State Governments to liberalize their rules. Attempts are also being made to pursuade State Governments to reduce the rate of interest on such advances to 5%. To share losses that the State Governments may incur on this account, the Central Government has offered to meet 50% of the losses up to a total [illegible] of 5% of the funds advanced.

ELECTRIC FAN INDUSTRY

Mr. T. R. Gupta, presiding over the annual meeting of the Fan Makers Association of India, held in Calcutta said that a slight setback in the progress of electric fan industry was due to the slight delay in the supply of power under river valley projects to many unelectrified towns.

The industry's present total production capacity, he added, was about 450,000 fans a year, while the figure for 1954 was expected to be 250,000 fans, including 220,000 fans made by member firms of the Association. Nearly 50 p.c. of the installed capacity of the industry remained unutilized.

The total demand at the end of the period covered by the first Five Year Plan was estimated to be 320,000 fans. Fans made in India were also acceptable to foreign countries. In 1954, altogether 30,000 fans were exported. Mr. Gupta believed that with improvement in design, performance and appearance, the industry could sell their products in foreign markets at competitive prices.

He regretted the reported exclusion of the fan making industry from those that needed further planning. He urged the Planning Commission to make a survey of the existing and potential production of the present manufacturers and assess the demand of both internal and external markets and the availability of raw materials.

Mr. Gupta hoped that the results of the first Five Year Plan would be increasingly felt during the period of the second Plan, when the standard of living of the people would be raised and new areas electrified. It was essential that the industry should make efforts to reduce production costs so that people of the low income group could buy fans. He suggested that the Planning Commission should subsidize electric connexions to encourage people to make greater use of electricity and electrical appliances.

To strengthen the competitive position of Indian fans in foreign markets the Government of India should refund the duty realized from the industry on imported raw materials. Mr. Gupta referred to the need for organizing the manufacture of certain parts on a cottage industry basis, which might result in higher productivity at a reduced cost.

AGRICULTURAL ...

HOW TO MAKE ORGANIC MANURES

EVERY garden should provide its own organic manure but this is impracticable in town where space is limited and there is fear of neighbours objecting to noxious odours which might arise.

The size of pits should never be less than four feet in diameter and the same in depth. If the excavater earth is piled round the edges it can be used to cover the manure when the pit is full.

All manure should be sun-dried; if spread out and broken up when first excapated the grubs of beetles which are such a curse in cow manure, for instance, will be discovered and can be removed.

Cow manure must be stored under cover as it loses a large percentage of valuable substances when exposed to the weather. It should be rotted for at least 18 months to be thoroughly matured for use.

Stable (Horse) manure is ready within six months and should be collected without too much straw and if possible moistened during dry weather to hasten decomposition.

Leaf mould is prepared from either dry leaves or green vegetable matter but such trash as plantain steams, branches, etc., as well as leaves of Bamboo, Tamarind, etc., should be excluded. The mali has the unfortunate habit of dumping any old rubbish he collects into the manure pit with the result that a pile of tins, broken pots and brick once to light when leaf mould is screened. Leaf mould should be under ground twelve months, then piled for further three to six months before it can be screened for use. Flood the pit during dry weather and if you have a very large pit and wish to obtain quick results lay down [illegible] six inches deep, when the pit is [illegible]. The fermenting of this will hasten the rot of the leaves. The leaf pit need [illegible] be covered with earth.

Kitchen refuse is liable to [illegible] crows and jackals unless a cover [illegible] provided for the pit; bones, [illegible] the hundred and one bits of [illegible] viscera, together with the leaves [illegible] cabbages, etc. make a strong [illegible]. Earth should be laid down every [illegible] or ten days, a couple of inches [illegible] and the pit sealed when full for a year at least before it is ready for use.

As to application, soluble manure, i.e., Nitrate, should be used when plants are in growth; insoluble, e.g., Bone Meal, 2-3, months before required. Once a week, as soon as the plant shows natural advance of growth, is quite often enough to apply liquid manure. It is no use trying to manure a dormant plant or one lately recovering, for neither has a change of utilising the manure. Avoid using liquid manure in dull weather; the dry material dug in at any period, wet or dry, does not matter but in liquid form it lies uselessly in the soil. Apply away from plants and whenever possible in the evening.

For Vegetables.—Pod types [illegible] Beans, Peas, etc., apply when pods commence swelling.

Root Types—Beet, Onion, etc., as soon as the bulbs swell.

Leaf Types—Cauliflower, Spinach, etc., require manure as soon as strong growth starts.

For Flowers apply when buds appear though weak doses earlier, to help foliage, are quite in order.

As to quantity to use, homeopathic quantities are always more satisfactory than a strong dose, all manure [illegible]

... the plant, if it cannot ... of ... of the roots, must collect and ... in damage by clogging the soil.

AGRICULTURAL OPERATIONS FOR FEBRUARY

FOR THE PLAINS.

Vegetables :- Little can be done during this month in the cultivation of European vegetab!es, except copiously watering those that are already in ground.

Sowings of Lettuce, Mustard, and Cress may still be made.

To Peas that are reserved for seed, less water, if any, should be given as they ripen.

Fruits :- Water Loquats liberally as well as Peach, Plum, Lichee and Mango trees as soon as the fruit is set.

Earth up and water Pine-Apples.

Fert'lise Vanilla flowers.

Sow seed of water me!on.

Ornamental Plant - This is the best season for transferring such Orchids as required to new pots or baskets.

Hoyas will be started into growth, and should either have the soil in the old pots partially changed or be potted afresh; the soil in the old pots partially changed or be potted afresh ; they will now bear dividing so as to make several plants out of one.

Re-pot or re-plant Caladiums, Arum pictum, Manettia cordifolia, Cyrtopera flava, Hibiscus Jerroldianus, Gloriosa superba and all such like plants, that have been lying dormant during the cold season as well as the several species of Crinum, Globba, Pancratium, ..., Hedychium, Hippeastrum and ...

Sow seeds of Poinciana, Tecoma, etc. ... off the choise kinds of Roses raised from cuttings laid down in November and keep them in the shade well watered.

Roses now may be layered with success.

FOR THE HILLS.

Vegetables :—During this month the heaviest falls of snow occur generally; but this should not deter the careful gardener from making preparations for the sowing of early vegetables in pots, pans boxes, and glazed frames having bottom heat. By bottom heat is meant a hot bed, into which the pots and pans must be plunged up to the rim. Seeds of Carrots, Turpins, Lettuce, Cabbage, Cauliflower, Spinach, Endive, Asparagus, Radish and Cress must be kept in the green house or stove.

Fruits :- About the end of this month the fruit trees will begin to show signs of reviving life. The roots should be cleared of all rubbish and preparations made to open the soil round them. This should not however be done unless there is a prospect of the snowfall ceasing. If the season promises to be an early one. Apple, Pear, Apricot and Plum trees should be pruned about the end of this month and manured. Straw-berry beds should now be prepared and the suckers transplanted.

Flowers :- In the flower garden the busy time will begin about the end of this month. Sowings of English of Annuals should now be made in pots and pans especially Calceolaria Cineraria, Heart sease, Aster and Larkspur as these take longer to develop than others. If it has ceased snowing, Roses, Geraniums, and Fuchsias should be pruned and the cuttings put down in sand in the propagating frame. This is the best time to re-pot Geraniums and Fuchsias, and Roses in pots. The beds and borders out of doors should now be looked to, and cleared of all rubbish, and the soil dug up and got ready for planting.

Manufacture of Patent Leather

IT is desirable to have certain qualities in leather that is to be finished for patent. Among these are strength, fullness of feel, lack of unnecessary stretch and a tight break. In order to obtain some of these qualities it is necessary to choose carefully the right raw material. This will largely determine the grade of the finished leather.

Soaking can be done in the usual manner. The stock should then be fleshed. For tight leather it is necessary to use the sulphiding method for unhairing, that is, from 5% to 7% of crystal sodium sulphide on the hide house weight of the stock. Five thousand pounds of stock are placed in a padle wheel with 3500 to 4000 gallons of water for a period of twelve to fourteen hours. The sulphide is then run off and fresh lime placed into the paddle, using 7% of lime. The paddle is run several times daily and after four days the stock is removed, unhaired and piled up overnight. The next day it is split and washed, bated and pickled. General practice of sulphiding indicates that looseness is nearly entirely overcome by its application and that liming is conducive to a loose grain and coarse break. Tanning can be carried out by the regular one bath process. Colouring can best be done without the use of wood dyes. A good direct black is best for this purpose. Wood dyes such as logwood, tend to a harsh grain.

Fat-liquoring depends upon whether the leather will be degreased later. For leather that is not to be degreased, a fat-liquor of 1% of a good grade of sulphonated neatsfoot oil will suffice. For leather that is to be degreased, an emulsion of neatsfoot oil, soap and cod oil to the extent of 7% on the weight of the stock crust for at least ten days. This is one of the most important stages in the making of patent leather. Tanning should be very carefully watched. An even and uniform distribution of moisture is essential. This stage should require forty-eight hours before the stock is tacked. After tacking, it is well to soak the stock again for three or four days. After the leather is degreased, it should be finished as soon as possible as it has a tendency to become pipey if permitted to remain long in this condition.

Usually three coats of finish are applied to patent leather. Each is made differently. Two types of oil only are used.

The boiling of oil is best done in a hooded kettle after the addition of 50 to 60 oz. of Turkey raw umber to each 50 gallons of oil. The temperature is slowly raised to 550°F., held there for ten minutes cooled off to a temperature of 530°F., and again slowly raised to 550°F. This is repeated four times. It is then held at the high temperature until finished. This requires about two hours. During the heating period, the oil is continually stirred with a regulation ladle. The formation of leaf-like "slabs" on the mouth of the inverted ladle is an indication of the consistency. When the leaves persist it is necessary to use the fork and remove the kettle from the fire. When the sweetmeats form across the prongs of the fork, the kettle should be cooled as rapidly as possible. When a temperature of 400°F. is reached, it should be reduced immediately with varnish maker's naphtha. The naphtha must be well assimilated by the sweetmeats by continual "puddling." This is important for if the sweetmeats is not all

hen up and solidified at this stage it
I be impossible to do anything with it
r.

The sweetmeats is aged for at least
a week before it is used. It is then
ther thinned with naphtha and the
cessary colouring matter added.
plication of this finish is either with a
ab and palmed. The finish should dry
ernight in a well ventilated room which
ist be kept at a uniform temperature of
°F.

This finish as well as the final varnish
at comes from the same oil. This oil
also made from a selected North
merican seed. The seed should be of a
tter selection than that previously
entioned for the sweetmeats and they
ust be absolutely free from all foreign
atters as well as other seed. It is
ressed warm and then steamed to a high
mperature after which it is filtered with
ller's earth, tanked and allowed to age
or at least six weeks.

For each gallon of oil 3 oz. of Turkey umber and ½ oz. of leather is added. This is boiled in quantities of fifty gallons in the same kind of kettle that has been mentioned. The oil is rapidly brought to a temperature of 650°F. and held there for from three to four hours, with continual ladling. When strings of the boiled oil are observed forming on the inverted ladle, it is ready to be removed from the fire. Stirring continues until leaves form on the ladle. The kettle is then cooled as rapidly as possible to 300°F. when fifty gallons of naphtha are added to the contents of the kettle. Constant stirring is necessary. The finish is placed into storage tanks and permitted to age three weeks before use. For the application it is thinned to a working consistency with naphtha and applied wih a flat camel hair brush. This second coat is dried in oven at a temperature of 140°F. for at least 18 hours. After the finish is thoroughly dried the surface of the leather is pumiced in order to remove all specks of dirt or foreign matter. The stock is now ready for the last or varnish coat.

Heat Treatment of Spring and Alloy Steels

MANY blacksmith endeavour to weld automative spring leaves, but they are rarely successful, and all steel experts agree that it is largely a waste of time. It is far better to either use a new leaf, or a new spring. If a new leaf has to be turned out in the shop, the blacksmith can get a leaf that will give good service if he has good carbon steel of the proper grade. Steel should be from .90 per cent to 1.10 per cent carbon. Never use carbon steel as high as 1.25 per cent, as this makes a brittle spring that will easily break. The lower carbon steels are more suitable.

Aside from improper steel, the majority of spring failures are usually due to using too high a temperature for heating the spring for fitting, followed directly by quenching from whatever temperature the steel may happen to be, and then this is usually followed by drawing the temper of the spring by flashing". The old practice of high temperature in forming and hardening springs with a single heat cannot fail to give trouble. The blacksmith generally heats the steel to about as high a temperature as it will stand without burning. This has a very bad effect upon the structure of the steel, but even assuming that the proper temperature has been used in fitting the spring, the operation of fitting gives the steel a change to cool down to a temperature where it will not harden properly.

Further, the steel is not all a uniform heat over its length, so that if quenched directly after forming it will set up internal strains in the steel, which will possibly lead to breakage later. The spring should always be put back in the heating furnace and re-heated for a few minutes uniformly throughout its whole length to the correct temperature. It is difficult in the open fire to get a uniform heat upon a spring. This is what makes it so hard for the averege blacksmith shop to properly temper springs. Without a heating furnace the blacksmith is greatly handicapped.

For drawing the temper in the spring never use the "flashing" process. The policy of replacing the steel (after it is quenched) in a heating furnace until the outside of the steel reaches the desired temperature is very bad, because of the impossibility of getting uniform heat treatment. No time is allowed for the heat to soak to the centre, with the result that the hardness increases from the outside—a most undesirable condition. All spring steels should be drawn back in a suitable low temperature furnace, maintained at the proper heat. The steel must be kept in the furnace sufficiently long to give a uniform heat throughout its whole structure.

One of the difficulties in all heat-treatment of spring steel and alloy steel in the average shop is the impossibility of accurately determining the heat given the material, and the heat at which it is quenched or drawn. This is an easy matter in a furnace where pyrometers are used, but in the average shop it is very difficult to gauge the heat by colour alone.

In handling springs a quenching temperature of 1,500°F, gives the best results, while the drawing temperature should be about 600 to 650°F. The accuracy of the eye in determining colours comes into play. A quenching temperature of 1,500°F. means that you must get the steel to a bright red. The colour for drawing back the spring at [illegible]

...°F. should be a bluish green. There is scarcely two men who agree as to temperature by colour, but without the aid of instruments the following temperatures in degrees F. are found at the heat colours given:—

White heat, 2,200; light yellow, 1,975; lemon, 1,825; orange, 1,725; salmon, 1,650; bright red, 1,550 to 1,500; cherry red, 1,375; medium cherry, 1,250; dark cherry, 1,175; blood red, 1,050 and faint red, 900.

Below this scale there is, of course, a wide range of tempering colours which should be used, *particularly in tool work*. These run from a blue green heat at ...°F. to dark purple, 550; dark brown, ...00, and a straw colour at 460°F.

Quenching springs should be done in good heavy tempering oil. Let it be stated emphatically that there is no such thing as a self-hardening spring steel manufactured, for there is no alloy steel that can cool off naturally in air and yet have the characteristics necessary in a good spring.

It is often considered by the gas welder that he can weld a spring with the torch. Since springs are made of specially heat-treated steel, it is surely evident that any application of heating from the welding torch will at once destroy the quality of the metal. This type of repair can never be recommended. It is far better to use a replacement spring than to weld it, if you have not the equipment for properly heat-treating and quenching the spring as outlined above.

It is obvious that alloy steel springs must combine great toughness with a high elastic limit. Carbon steel springs contain not only carbon but manganese, phosphorus, sulphur and silicon, and the carbon content must be correct, from .90 per cent to 1.10 per cent or you will have a brittle spring. The quenching temperatures for alloy steel springs are very important. In a chrome vanadium steel which is now generally used, the steel should be brought up to a full cherry red heat, that is, about 1,475°F. and allowed to cool slowly, that is, sufficient time to allow uniform cooling.

These alloy steel cannot be handled as most carbon spring steel and still give maximum service. They are, however, lower in carbon and will stand much abuse in heat-treatment and still produce springs of good quality. Alloy steels should never be heated any higher for forming the spring than is absolutely necessary, but they must always be reheated to the proper temperature for quenching, and that temperature must be exact.

The mechanic should have a knowledge of the constituents of steel before he can effectively give it the proper heat-treatment. The structure of any particular steel may be modified or entirely changed by various degrees of heating, all of which take place in the steel while it is in the solid condition. These structural changes in the steel take place at temperatures known as the "critical" points or critical ranges of the steel.

In a low carbon steel, about 2 per cent, practically no change in the constituents occurs during heating until a temperature equivalent to about 1,300°F. is reached. In passing through this critical range there is a complete change in the "pearlite" in the structure of the steel. The steel consists of about 25 per cent "pearlite" and 75 per cent free ferrite. At the critical range the ferrite is converted into an entirely new constituent, so that the whole structure of the steel is changed.

Every class of steel has its particular critical point. In heating for hardening there must be much care taken than heating for annealing. Heating for annealing is followed by slow cooling and the gradual release of all strains in the steel. The heating for hardening is followed by

the same speed that the steel has to stand—very rapid cooling, which sets up a condition of stress and strain in the metal. In general, the heating of steel for hardening should be slow, uniform and thorough, and at the lowest temperature which will get you the right results.

It becomes non-magnetic temperatures—its critical range. At first the steel changes from its original colour to a faint yellow, straw colour, purple and then to blue, until at a certain temperature it apparently stops heating, although still remaining in the fire. It holds a certain colour for an appreciable time, after which it again starts to change colour and appears to heat faster until a white heat is reached.

The blacksmith should note this point where the steel seems to get no hotter as indicated by the lack of change in colour This is the temperature at which the particles of the steel are re-arranging themselves, which have referred to as the "critical point." The steel is actually absorbing heat without getting any hotter. You can check this critical point very accurately by using an ordinary horseshoe magnet suspended from a suitable rod. When the correct hardening temperature has been reached, there will be no attraction between the magnet and the steel. Use the ordinary horseshoe magnet, or magnetize a small diamond-shaped piece of steel and support it between two pins on the end of a forked rod.

For low carbon steels, or for small parts made of higher carbon, water quenching can be used without danger. On the other hand, if the ... has got to be quenched and toughened oil will be found superior. Brine should only be used in particular cases, where very hard surface is required.

In all heat-treatment of modern steel it is impossible to get the best results in the open forge. An oil furnace or gas furnace is necessary to get results. Where natural gas is available, the blacksmith can very readily build a satisfactory heat-treating furnace, and it is well worth the time and trouble. It should never be forgotten that in gas welding the heat generated in the metal in welding has a marked effect upon the structure of all steel, so that only by subsequent heat-treatment can be welded get the proper strength at points just beyond where the welded section unites with the original metal.

These alloy steels have properties that make them superior to plain carbon steels only after they have been heat-treated under carefully controlled conditions. Welding destroys the effect of the heat-treatment in the zone adjacent to the weld. It is, of course, possible to restore the properties of the alloy steel by heat-treating it again after welding, but this requires equipment that is beyond the average repair shop. As an example, welding of such parts as alloy steel automobile axles or steering knuckles should never be attempted. Owing to the effect of the welding heat, the welded section will not be as good as the rest of the metal, nor will it be strong enough for safe operation of the machine.

The Processing and Storage of Nuts

MANY dessert nuts are of a perishable nature and soon lose their palatability or become inedible if not properly dried or cured after collection, or if badly stored. The proper processing and storage of nuts is therefore all-important. Some nuts are naturally much better keepers than others. Among the common nuts, walnuts and chestnuts are among the more perishable while the pistachio and the almond are among the better keepers. These two nuts may retain their palatability for a long while without any special storage precautions.

The processing or treatment that nuts receive before they reach the table or the shop window varies a great deal with different nuts. The present tendency is for nuts to be marketed more and more as kernels, in special packs ready for immediate use by the house wife or at the table. It is in this form also that they are required in the confectionery trades. The marketing of kernels in place of nuts involves many special methods of processing, packing, and storage.

DEHUSKING

Most nuts as they grow on the tree are enveloped in a fleshy or fibrous husk. As the nut ripens and falls from the tree the husk may or may not remain attached to it. This is the case with many of the important commercial nuts such as the walnut, the pecan, the almond, and the Macadamia nut. In some varieties of the walnut and of the almond the nuts separate readily from the husk of their own accord on ripening, and few nuts are picked up with the husk still attached. These few are referred to as "sticktight". In other varieties however the proportion of "sticktights" may be high. A poor or dry season may also be responsible for an abnormall h'gh percentage of nuts with the husk still attached.

The removal of the husks is necessary before the nuts can be dried or shelled or subjected to any other form of processing. This operation is often carried out by hand but in the important nut-producing countries, where large quantities of nuts are handled, power-driven dehusking machines are in common use, different types of machines being required for different nuts.

With walnuts it is important that the husks be removed soon after the nuts are collected for if this is not done both the colour and the quality of the kernels may be affected, apart from the disfiguration of the shells. All who have handled fresh walnuts know how readily the husk, when bruised or broken, will stain the fingers or anything else with which it comes in contact. The husks are best removed immediately after collection but if this is not possible they should not be allowed to remain on the nuts for more than a few days. If they remain on for any length of time the kernels become noticeably darker in colour and acquire a strong flavour that reduces their palatability to a marked degree. The longer the husks remain on, the greater is the deterioration likely to be. Discolouration and staining of the shells quickly occurs if the husks are not promptly removed. This considerably impairs the appearance and reduces the market value of walnuts sold in the

[illegible]

WASHING

When nuts are gathered up from the ground they are frequently solid or dirty, particularly if rain has fallen, and washing is necessary if they are to be marketed in an attractive condition. Even in the absence of rain nuts on the ground are prone to become dusty. Small quantities of nuts are washed by hand by being placed in a barrel of water and stirred or agitated. Various types of small hand-operated washers are in use, some of them home-made. Many are of the churn type. When large quantities are handled, as in walnut and almond orchards, washing may be done in cylindrical drums of coarse wire netting in which the nuts are slowly revolved under a stream of water. This causes them to rub against one another and the wires of the drum and to be cleansed of all loose foreign material. Washing of this sort does not affect stains which are removed during bleaching.

DRYING AND DEHYDRATING

In the drying or "curing" of nuts, drying by dehydration, i.e. by artificially produced heat and forced draughts of air, has largely taken the place of sun or air drying with many of those nuts that are produced on a large scale and on plantation lines. The actual dehydration process is very similar to that employed in the production of dried fruit. It has been found that the use of mechanical dryers or dehydrators gives more uniform and thorough drying of the nuts, with less splitting (in the case of walnuts). It is also independent of the weather and there is greater theft protection, which is an important consideration in some places. In America dehydration has also been found to lead to greater packing-house efficiency by stabilizing the rate of [illegible] market sooner than would [illegible] the case. It has been found [illegible] spite of greater investment needed [illegible] equipment and fuel costs the [illegible] dehydrating walnuts did not exceed [illegible] of sun-drying where labour costs in [illegible] extra handling, turning, etc., are [illegible] In American nut districts many different kinds of dehydrator are in use [illegible] gas, oil, or electricity as source of [illegible] or power. Capacity varies from 1 to [illegible] or 7 tons of nuts and the drying time [illegible] usually 12 to 24 hours. In the dehydration of walnuts it has been found [illegible] temperature should not exceed 110°F.

Sun-drying is still largely practised, particularly with almonds in the producing countries of Europe. Peasant cultivators and small producers cannot usually elaborate equipment. Excellent results are obtained in the sun-drying of almonds but the amount of labour usually required in handling the nuts and placing them under cover at night, or in the event of rain, is quite considerable. In sun-drying almonds are spread out in layers a few inches deep on trays or on sheets and stirred frequently to ensure uniform drying. At night they are usually placed under cover otherwise they are liable to absorb moisture which prolongs drying and gives a darker colour to the shells. When the kernels shake freely in the shells, or when a kernel breaks instead of bending when bent in the fingers, drying is considered to be complete. With continuous hot sun, drying may be complete in 2-3 days. On the other hand it may require 2-3 weeks with unfavourable weather. Wooden trays with wire mesh bottoms, some 7 feet long and 2½ feet wide, with handles at the two ends, are convenient for drying and may easily be carried and stacked by two men in a shed overnight.

[illegible] for any length of time drying in some form or other is essential, and is regularly practised in chestnut-growing countries. For many centuries in southern Europe chestnuts have been sun-dried or dried over a wood fire, often in a building or kiln specially constructed for the purpose. Drying by this method is generally a slow process, sometimes occupying several weeks, and heavy on fuel. Apart from the drying effect of the heat the smoke is considered to have a beneficial effect and to inhibit subsequent attack by mould. When the shells may be easily separated from the kernels drying or curing is considered to be completed. Chestnuts preserved in this way lose the characteristic flavour of the fresh chestnut and often acquire a disagreeable taste. When ground later and mixed with water, as is sometimes done, they are prone to absorb the astringent or tannin-like substances of the skin.

Much better drying is effected by mechanical dryers. These have the advantage of lightness and mobility and of being readily drawn from one place to another by tractor if necessary. Drying is effected more quickly and uniformly and there is much greater economy in fuel. As drying is completed in a few hours instead of several days or weeks their output is much larger than the old-fashioned static dryer. Electrical dryers have also been used with chestnuts.

BLEACHING

Some nuts, when intended for marketing in the shell, have their appearance considerably improved by bleaching. This generally removes all stains, including those due to sun scorch and disease, and gives a uniform colour throughout. Walnuts in particular are frequently bleached. This is done by immersing the nuts from one to two minutes in a bleaching solution.

Bleaching by means of sulphur dioxide burning sulphur is also used with nuts, particularly almonds, but is probably employed less now than formerly. Good quality almonds that have been quickly dried under favourable weather conditions are of an attractive natural colour and require no bleaching. It is only when the shells are blemished through some cause or other, usually rain during collection or drying, that bleaching is restored to. Various methods of sulphur bleaching are used in Europe but care has to be exercised in using the right amount of sulphur for the quantity of nuts. Too much sulphur or over-bleaching gives the shells a sickly white appearance and is prone to soften them and affect the taste of the kernel, whereas too little causes irregular bleaching.

With pecan nuts it has been found that their appearance is considerably improved by removal of the outer rough layer and by polishing and that so treated the nuts are much more responsive to bleaching and to dyeing, should this be required. Removal of the outer layer is carried out by steel brushes or by placing nuts in revolving drums with coarse sand. Bleaching is effected by dipping the nuts for about four minutes in a suitable bleaching agent (sodium hypochlorite containing 2 per cent active chlorine). Polished, bleached pecans may be attractively dyed brown or reddishbrown with various dyes. Nuts treated in this way possess the attractiveness and uniformity of colour that is seldom to be seen in untreated nuts and if properly carried out the kernel is in no way affected. The fact that the dye sometimes comes off and stains the fingers, particularly of persons handling many nuts, has

[illegible] drawback of this treatment.

GRADING

In grading nuts for size mechanical graders are in common use. These work on the same principle as those used for other similar commodities such as potatoes, oranges, apples, and other fruits. A common type of mechanical grader used for nuts is a perforated revolving cylinder with a central spiral which moves the nuts from one end of the cylinder to the other. The perforations in the cylinder are of various sizes so that the smallest nuts fall through and the larger ones are carried on towards the end of the cylinder. Nuts may be graded into any number of sizes this way. With pecan nuts, owing to their oval or oblong shape, special graders are used made of rollers at varying distances apart.

In large packing houses, such as these for walnuts and pecans hand picking for the removal of imperfect, faulty, or broken nuts is also carried out, the nuts passing before the operators on a continuous belt. A suction machine is also used which has the effect of lifting the blank or imperfectly filled nuts over a trap while allowing the heavier, full meated nuts to pass on.

An ingenious method of grading Macadamia kernels for quality by floating has been practised. It was discovered that high quality, Grade I kernels, i.e., those that are plump with a smooth surface and high oil content, have low specific gravity (i.e. are relatively light). When a sample of kernels is placed in water (tap water) such kernels float and the other inferior kernels sink. If the latter are then placed in a solution of common salt in water (5½ ounces per gallon) [illegible] sink, constituting Grade 2 and Grade 3 respectively. After such treatment the kernels must be thoroughly dried. The plump Grade I kernels are light coloured and roast uniformly with a mild flavour. The other grades, usually darker and of stronger flavour, are sold to the confectionery and baking trades.

STORAGE

In the storage of nuts most kinds will last for several months if they are kept cool and dry. Under warm humid conditions however nuts are subject to rapid deterioration and become mouldy or rancid. Many nuts (in the shell) may be held for longer periods in cold storage but there is an increasing tendency to store the shelled nuts or kernels in cold store. Less space is required for shelled nuts. The cold storage of nut kernels, however, requires certain precautions. The best results are obtained by storing them after thorough dehydration in moisture-proof containers of some sort or other such as sealed tins, glass jars, or moisture-proof cellophane. In this condition, unable to absorb moisture, they have been stored experimentally for periods up to two years and have retained all the fresh nut where texture, flavour, and colour are concerned. If sealed containers are not used and kernels are placed in cold store in open receptacles there is a strong tendency for the kernels to absorb cold-storage odours (ammonia) and for the fresh nutty flavour to give way to one that is flat, insipid, or rancid. The texture also suffers. There is a loss of crispness and a mealy tough or soggy texture takes its place. With unsealed, undehydrated kernels the colour is also liable to deteriorate in cold storage, becoming darker or uneven and splotchy. Cold storage in vacuumized containers or

with inert gases such as nitrogen or carbon dioxide appears to have little advantage over ordinary cold storage for a similar period.

With some nuts, e.g. the pecan, commercial cold storage has become a general practice. By holding nuts over for some time after the harvest period much better prices are likely to be obtained and these more than offset the cost of cold store. In the case of a heavy crop it may be profitable to keep a portion in cold store as the following crop is likely to be smaller and better prices prevail.

As light, especially direct sunlight, has a blanching effect on oils and fats, nut kernels should be stored away from light, although most storage conditions involve total darkness. Nuts in the shell should also be protected from sunlight.

Chestnuts when gathered in the autumn may be retained in the fresh condition for several months if properly stored. Left where they fall under the trees very soon deteriorate or disappear, being a popular food with animals of various kinds, especially rodents. Owing to their high moisture content when freshly gathered they are very prone to be attacked by mould or mildew if stored in the mass where ventilation is poor, as when placed in a box. Placed in small heaps or thin layers in an airy outhouse, which need only be walled in on three sides, and turned over periodically, they will keep in a perfectly fresh condition up to three months or even longer. Storage should avoid as far as possible the nuts being subject to extremes of temperature. If stored too dry or in a single layer loss of moisture is rapid and the kernels shrivel and become hard.

Immersing the fresh nuts for 48 hours in water to which a fungicide has added, has been found to be effective in preventing mould during storage. With such treatment it is necessary to dry off the superfluous moisture on the nuts before storing. This treatment has the advantage of also destroying harmful grubs or insects that may be infecting the nuts. Gas treatment, which involves the use of special apparatus (autoclaves), has also been found to be an effective pretreatment in France in recent years.

Chestnuts have also been successfully held in cold storage in France enabling the nuts to be sold as fresh chestnuts in the off season when good prices are obtained.

When intended for sowing chestnuts are often placed in layers in sand. Kept in a cellar or cool place in this way they keep well and retain their germinating powers but may become less palatable.

Barcelona nuts are sometimes stored for a time in sawdust which helps to prevent shrivelling.

In extracting the kernels from nuts they may be either extracted by hand or by machinery. At one time all the nut kernels put on the market were the product of hand cracking, but special mechanical crackers capable of dealing with nuts in bulk in a short time are now in use with the more important nuts. The machines vary according to the nut for which they are intended and are often of an ingenious and complicated nature. Nevertheless large quantities of some nut kernels are still extracted by hand, such as those of the cashew and the almond (in some countries).

In hand cracking the operator usually uses a small baton or hammer and each nut is cracked separately on a stone or block of wood. In some European countries this is largely a winter occupation (e.g. with almonds), and the work is well adapted for those

unsuited for more strenuous occupations through age or infirmity. Skilled crackers produce a minimum of broken kernels, but however skilled, the work is slow and the output per man or woman hour very low. Mechanical cracking usually results in much higher percentage of broken kernels. But as these find a ready outlet in the confectionery and certain other trades this drawback is not serious.

For cracking a few nuts as dessert at table or in the home a number of different types of hand nutcracker are in regular use. The most common are those consisting of two metal rods or handles with a hinge-like connection at one end and notched or grooved to prevent the nut from slipping. Some people prefer the other types, i.e. those worked by a compound lever or by a screw handle working on the principle of a vice. These may be used to exert pressure on the ends of the nut, cracking it without crushing the kernel very seriously. A metal-worker's vice, in one of the smaller sizes is a very efficient if not very ornate form of nutcracker when fixed to a table or bench. Some nuts, such as the black walnut, swarri nut, and Macadamia or Queensland nut, are too hard shelled to crack in the hand with an ordinary pair of nutcrackers and special crackers are used.

The power-driven, self-freeding nutcracking machines often work on the same principle as the vice and may be, in effect, little more than a series of vices with the jaws specially set for the size of the nut and automatically or instantaneously operated. The nuts are graded for size before they are fed to the cracking jaws or rollers. Special shaking devices separate the kernels from the shells and the kernels belt where operators remove by h[and] any bad kernels, fragments of shell, [or] foreign matter that may be present.

In a machine in common use wi[th] the pecan nut an endless chain be[lt] with cups just big enough to hold o[ne] nut passes through a hopper of gra[ded] nuts. Each nut is carried over to [a] slot of the machine where a piston-li[ke] rod exerts pressure on the ends of th[e] nut and cracks it, the shells and kernel[s] being then released to a receptac[le] below. With pecan nuts that are ver[y] dry the kernels often shatter badly wi[th] this treatment. Soaking or moistenin[g] the nuts some time before crackin[g] makes the kernels less brittle and re[-]duces chattering. When this is don[e] the kernels are redried after shelling.

In the Macadamia nut the differen[-]ces in the thickness and texture of th[e] shell have presented difficulties i[n] developing cracking machines suited t[o] the nut, the difficulty being to crack th[e] shells without injury to the brittl[e] kernels. In the dry nut the clearanc[e] between the shell and the kernel is onl[y] about 1/32 inch. The commercia[l] crackers now used employ the principl[e] of the vice, the nut being held betwee[n] two blunt movable wedges. They ar[e] of simple design with low power requir[e-]ments. In Hawaii the Macadamia i[s] seldom sold in the shell, the deman[d] being for shell, cooked kernels, read[y] for eating.

Another nut where the demand i[s] entirely for the kernel rather than th[e] nut in the shell is the pignolia or pin[e] kernel (Pinus pinea). Special crackin[g] machines are used for this nut in th[e] pine kernel districts of Italy and othe[r] European countries, and exports con[-]sist entirely of the kernels.

A few nuts possess a tough o[r] fibrous shell which cannot be cracked i[n]

the oyster nut. In the case of the [cash]ew with its tough, leathery shell or [peri]carp, this difficulty is overcome by preliminary roasting which has the [effec]t of making the shell brittle and [resp]onsive to cracking. This roasting [also] renders the shell less likely to in[jure] the skin of workers, for it contains [a ca]ustic or blistering oil. Roasting is [gene]rally done by hand in an open iron [pan] over a small circular earthenware [furn]ace. Small quantities of nuts are [roas]ted at a time and the process only [take]s about a minute. Skill and good [jud]gment are required to avoid over[roas]ting or charring the kernels. If [und]ercooked the shells remain tough. [Atte]mpts at roasting in ovens instead of [th]e open pan have not met with much [succ]ess and resulted in discoloured [kern]els.

The shelling of the roasted cashew [nu]t has so far always been carried [out] by hand, a suitable machine for [larg]e-scale work not yet having made [its a]ppearance. In south-western India, [the] centre of the cashew industry, this [wor]k is done by women and children, [usin]g a sort of wooden mallet and a [flat] stone. Great care is required if [kern]els breakage are to be reduced to [a m]inimum. The kernel is sometimes [rem]oved from the cracked shell with a [wir]e prong. In order to remove the [tes]t or reddish-brown skin on the [kern]el, and this is essential for export [pur]poses, the kernels are spread out on [wire] gauze trays in a hot-air room under [cont]rolled temperature. This has the [effe]ct of loosening the skin and also [rem]oves any excess moisture that may [be] present in the kernels, thereby [redu]cing the likelihood of mould [appe]aring during storage.

Another good example of a dessert [nut] with a tough leathery, fibrous [shell] that cannot be cracked in the [ordin]ary way is the oyster nut. Up to the present the kernels have been extracted from this disc-shaped nut by hand, by slitting the edge of the nut with a knife. It remains to be seen whether any form of mechanical extractor will be devised to deal with this particular nut if large-scale production of kernels takes place.

A Chinese method of cracking hard shelled nut is to first heat them by burning straw over them and then to effect sudden cooling by dashing cold water over them.

The shells of nuts, for long regarded as waste products or used for fuel only, now have industrial uses. When cleaned and ground to a fine powder the shells of some nuts (notably walnuts, coconuts, Brazil nuts, and almonds) have been used as an extender or filler in the manufacture of certain plastics and synthetic glues. For some purposes they are claimed to be superior to the softwood flours commonly used. The coarser grades of walnut shell powder have been employed as cleaners and finishers in the fur, metal, tinplate, and other industries. Additional uses are in linoleum, jointless flooring, and as a carrier for horticultural insecticides.

COOKING AND SALTING

Some nuts are frequently eaten in the cooked and salted state and are generally considered to be more palatable and possibly more digestible this way. The peanut and the chestnut are seldom eaten except after cooking. Almonds are generally considered at their best when roasted or toasted and salted. The same applies to the Macadamia nut. In the case of pine kernels or pignolias cooking definitely reduces the terebinthine of turpentine flavour that some people find objectionable.

For roasted or toasted almonds ...

is customary to use the best grades—kernels that are large and plump—for they are often sold in fancy glass containers. In order to avoid burning or charring roasting has to be carefully done. Roasting or cooking in oil is considered to give the best flavour, as is the case with most nuts. A common way of salting almond is by immersion in a strong brine solution before allowing them to drain and dry.

Macadamia nuts or kernels in Hawaii are invariably sold in the cooked and salted state, being considered more palatable this way by most people. These kernels are either roasted in a oven or immersed in a vat of hot oil. In commercial processing in Hawaii oil cooking is preferred to oven roasting the oil-cooked kernel having a superior appearance—an attractive gold-brown colour. In oil cooking temperature and time are important factors and it is important that kernels are first properly dried otherwise they do not acquire the much desired crisp texture and tend to become rancid early. A refined coconut oil is now used in the cooking of many nuts, including the Macadamia. As many of the commoner metals are corroded in time by hot oil, monel metal, stain-less steel, or glass are used for the va

After cooking excess oil is remov by centrifuging and the kernels a then spread on wire mesh trays f rapid cooling. While still lukewar they are salted. This is done by spray ing slightly with a 15 per cent wat solution of gum arabic, or a special a and dusting with salt. The adhesiv solidifies on the surface of the kerne and prevents the grains of salt fro becoming detached.

As cooked kernels absorb moistu readily they are packed as soon as the are salted and cooled. Vacuum packin is now the practice with Macadami nuts as with other nuts.

For oil cooking in the home any the common salad oils may be subst tuted for coconut oil.

Cashew kernels are also alway marketed in the cooked state, for th roasting treatment to which the nut are subjected in order to render th shell more easily cracked automaticall cooks the kernel.

With the chestnut there are man in which it may be cooked. Mos people consider the flavour of this nu at its best after roasting.

Use of Gums in Pharmacy and Cosmetics

In the field of pharmacy and cosmetics the hydrophilic colloids are used because of their mucilaginous or oily nature and their properties of soothing inflamed or abraded membrane or skin areas and protecting them from irritation. They are often referred to as demulcents or emollients. They are suspending and emulsifying agents in creams, lotions, ointments, pastes, jellies, face creams, and other cosmetic preparations. The property of the hydrophilic colloids of formings films upon evaporation along with their ability to be plasticised or softened by other components accounts for their presence in hair lotions, parmanent waving compositions, bandoline, and wave-setting materials.

Gum arabic under the name Acacia is the first material in the Pharmacopoeia of the United States the eleventh decennial revision. The same volume contains agar, gelatin under the name of Gelatinum, flaxseed or linseed under the name of Linum, the mucilages of acacia and of tragacanth under the name of Mucilago Acaciae and Mucilago Tragacanthae, and tragacanth under the name of Tragacanthae. The National formulary of the Committee of the American Pharmaceutical Association, sixth edition, lists chondrus as well as the names of Irish moss and carrageen, Dextrinum Album for white dextrin, also under the name of British gum, while a number of unofficial lists closely connected with the cosmetic arts include Cydonium or quince seed, karaya under names such as Indian tragacanth and Gum Sterculia, and other unofficial pharmaceutical listings include psyllium which is included in the British Pharmacopoeia Codex of 1923.

Acacia mucilage is made by placing 350 g. of acacia or gum arabic in small fragments in a litre bottle and adding distilled water in which 1 g. of sodium benzoate is dissolved, allowing the acacia dissolve and making up to 1000 cc. Tragacanth mucilage is also made in proportions of 6 g. tragacanth mixed with 75 cc. of hot distilled water containing 18 g. of glycerine. After complete solution, the mixture is diluted to 100 g. and strained.

Redgrove studied setting lotions made from psyllium seeds and found less effective than those from quince seeds.

To prepare a decoction of psyllium seeds, boil 1.5 parts of bruised seeds for 10 minutes with 120 parts of water, strain and make up to 100 parts by volume. To prepare the lotion, take 100 parts of this decoction, add rose or distilled water 100 and, carefully, perfumed alcohol. 100 parts. Tint with any suitable dye and perfume with any synthetic product soluble in weak alcohol.

Schwarz gave formulae for the preparation of materials suitable for the care of the skin and hair, which formulae were founded on Irish moss, quince and psyllium seeds as well as tragacanth.

Redgrove described setting lotions made from quince seeds with tragacanth.

A basic formula with tragacanth is : potassium carbonate 40 g., mucilage of tragacanth 100 cc., alcohol, 100 cc., rose water to make 1000 cc. The mixture is also effective without the

[illegible] Quince seeds, [illegible] traga-canth, produce a clear lotion with hot or cold water, and when of good quality are rich in mucilage. For a weaker, yet quite effective setting lotion use a decoction of quince seeds 25, alcohol 25, rose water 100 parts. Addition of terpineol or other special compound will enhance the odour. Alcohol must be added carefully to avoid precipitation.

Goodman gives numerous formulae for hair curling fluid, hair set, finger wave, wave set based on acacia, chondrus, karaya, psyllium seed, quince seed, tragacanth, while others have suggested corresponding formulations employing alginates. The concentrations of the gums or hydrophilic colloids are of the order of 1 to 4 per cent, the most effective ranges appearing to be 2 to 3 per cent.

It is estimated that approximately 100.000 pounds of agar per year are used in laxatives and laxative emulsions while perhaps 25,000 pounds per year are employed in pharmaceutical emulsions of various natures.

Figg studied psyllium seeds as a mild natural laxative in constipation. The mucilage test differentiates the worthless pale variety of seeds from the medicinal dark variety. Cover a small quantity of the seeds in a test tube with about 3 or 4 times their weight of water. After a short time only the dark seeds have swelled to a semi-solid mass which will remain in place when the tube is inverted.

Pin and Sound studied the diuretic effect of psyllium seeds. Observations with three human cases revealed a diuretic effect characterized by an increased output of water, urea, chloride and uric acid.

Kober suggested therapeutic preparations derived from psyllium seed. A pharmaceutical [illegible] promoting corrective [illegible] when used by injection is [illegible] an aqueous suspension of the fatty [illegible] of psyllium seed oil which are [illegible] into water-soluble salts, as by [illegible] with dilute sodium hydroxide [illegible]

Gray and Tainter [illegible] colloidal laxatives available for [illegible] use. These products can be [illegible] into the following groups: [illegible] clays, dried fruits, marine mucila[illegible] acacia, tragacanth and psyllium. [illegible] latter two groups contain the most im[illegible] portant products from the clini[illegible] standpoint. In distilled water the tra[illegible] gacanth preparations swelled to about 75 times the initial volumes, while the psyllium products swelled about half as much. In the presence of salt, hydro[illegible] chloric acid and sodium bicarbonate, [illegible] concentrations comparable to those [illegible] the gastrointestinal tract, the increase in volume were reduced to about [illegible] times for the tragacanths and 15 times for the psyllium products. Tragacanth derivatives exert their laxative action primarily through colloidal swelling while purified psyllium products add [illegible] their lesser degree of swelling a mil[illegible] direct irritant effect from their break-down products.

Baron suggested a bowel evacuan[illegible] for use by rectal injection employin[illegible] the hydrophilic colloids. A gelatinou[illegible] material such as gelatin, agar agar o[illegible] or gum tragacanth is dissolved in water, ox gall is dispersed in the material an[illegible] the resulting mixture is added to glycer[illegible] to form semiliquid or syrupy product.

Knight studied emulsions of petro-leum oil for laxatives and made sugges-tions for modifications. Since the us[illegible] of gum acacia (A) alone produces much smaller oil globules with liquid paraffi[illegible] (B) than gum tragacanth (C) as use[illegible] in the British Pharmacopoeia Codex

... recommends first making an emulsion with A, then incorporating B. Half the quantity of A prescribed would be sufficient. The use of 0.15 per cent benzoic acid is better than that of gum benzoic as a preservative. In the place of the expensive C, an emulsion petrolei cum agar-agar is recommended. Many modifications of petroleum oil and agar or other hydrophilic gums are widespread in daily use as mild laxatives.

Tice described a new form of edible gelatin for specific application in the pharmaceutical field under the name of Pharmajel. He suggested typical formulae for preparing emulsions and creams.

Kerriel suggested specific formulae for suppositories employing gelatin.

Redgrove discussed the gums and substitutes in pharmacy and cosmetic while McGee explored the field of gelatin as an emulsifier in pharmaceutical preparations.

Brown and Lum give specific formulae for agar and paraffin emulsions. To obtain the best results, triturate sodium bicarbonate 10 grains, powdered tragacanth 20 and powdered acacia 60 grains to a smooth paste with glycerol 6 drachms. Dissolve agar 17.5 grains in boiling water 2 fluid oz., add this while hot to the mixture in the mortar while stirring. Then add liquid paraffin 3 oz., 2 to 3 drachms at a time. Triturate until cold, allow to stand for 1 hr., triturate again for 5 minutes and add water to complete 6 oz. If an emulsifying apparatus worked by hand is available, a thick emulsion is obtained with agar 15, sodium carbonate 6 grains, liquid paraffin 3 oz., tragacanth 5, acacia 5 grains, glycerol 2 drachms, water to make 6 oz.

Agar is dissolved in hot water and minute globules of emulsified petroleum jelly are dispersed in the solution while hot and the mixture is permitted to cool while quiescent.

In preparing liquid products containing agar in a quantity greater than that which would normally form a firm jelly in the presence of water, the agar is dissolved in hot water in the proportions required to form firm jelly, and the solution is cooled and stirred to produce a semi-liquid mass of comminuted jelly particles and the latter are emulsified with a mixture of laxative oil and water.

Miller, Kurka and Chase patented a medical composition of mineral oil, agar and lactic acid.

Lactic acid is used in such a proportion (suitably about 0.25 per cent of more with mineral oil 37.5 and agar 10 parts) that it is carried into the intestines to exert an inhibitive action on any toxic intestinal flora. Water, glycerol, sugar and other flavouring and preservative substances also are added, while Carter incorporated milk sugar.

A composition for use in promoting growth of lactic acid bacteria in the intestinal tract comprises sugar of milk suspended in mineral midicinal oil and agar-agar.

Turrentine suggested drying of kelp at a temperature below the boiling point of the plant juice for the production of a dehydrated product in assimilable form for therapeutic uses.

Skinner gave practical notes on the preparation of ointment bases employing tragacanth as a dispersion agent.

An ointment primarily suitable for absorption is the following modification of the British Pharmaceutical Codex Unguentum lanolini oleosum: (A) Powdered tragacanth (No. 40) 2.5, (B) glycerol 20.0, water 100.0, (C) hydrous wool fat 250, (D) oleic acid 30.0 parts.

C previously mixed with D. Vegetable oils are good diluents, but coconut oil is regarded as a skin irritant.

Von Neergaard suggested the hydrophilic colloids as constituents in medicinal or candle shaped articles (bougies) for insertion in various openings of the body.

Bougies for the treatment of mucous canals and fistulas are prepared from silver nitrate or other water-soluble silver compound and substances which will swell and liquefy in contact with moist tissues, e.g., preparations of starch, tragacanth, agar, gum arabic, dextrin, gelatin, psyllium, laminaria, carrageen, quince mucilage marshmallow and linseed. In order to increase the swelling action, sulphates, citrates, oxalates, sucrose, urea or weak alkaline substances may be added. Kieselguhr may be added to promote diffusion, and glycerol to give increased elasticity. Dyes and other substances also may be included. The compositions are preferably prepared in darkness.

Koenigsberger suggested locust bean gum for a depilatory. A transparent base such as locust bean gum is used with a lithium-containing depilatory agent such as the reaction products of lithium hydroxide and hydrogen sulphide and with an inert gas such as nitrogen dispersed throughout the depilatory to form a material readily washed from the skin after use.

Bliss discussed a tooth paste for children and suggested formulae with gums as binding agents. A satisfactory paste is made from very fine calcium carbonate and magnesium carbonate as mechanical cleansers with tragacanth as a binding agent, neutral glycerol, a blend of peppermint and anise oils with

dentifrice containing gelatin and gum.

Okubo suggested a tooth paste. A mixture of magnesium silicate, gum tragacanth, soap, glycerol and honey is dehydrated under reduced pressure and the product is mixed with boron oxide.

It is estimated that from 15,000 to 100,000 pounds of agar and alginates are used annually in the United States in connection with dental impression moulds, particularly as substitues for tin foil in processing acrylic dentures and as principal constitutes of impression materials as well as denture adhesives. Molnar made a study of 94 different preparations employing gelatin and the sulphonamide drugs in an attempt to develop a dressing for burns which would embody the advantages and eliminate some of the disadvantages of a preformed film. The various modifications employed centred about 4 base formulae which are given; the most desirable is : sodium sulphadiazine 25, "Pharmagel B" (gelatin) 50, sulphadiazine 45. A-3 water (distilled water containing 0.52 g. methyl p-hydroxybenzoate and 0.28 g. propyl p-hydroxybenzoate per liter) 100 g. Thorough clinical evaluation was not accomplished, and definite conclusions cannot be drawn.

Wander suggested a greaseless ointment base. An aqueous colloidal dispersion of a light-metal compound is mixed in the proportion of 1 or 2 to 3 at elevated temperature (60°) with a vegetable gel obtained from mucilaginous algae. The pH of the mixture is brought to about 6.5 by addition of an organic acid. The product is a homogeneous, ointment-like cream, suitable as a base for cosmetics.

A wound treating compound was suggested in the form of a powdered

[illegible] to stop the flow of blood and is made by transforming gum tragacanth into grains corresponding to a size of particles of 0.07 to 0.5 mm. and then causing them to swell a regulated amount by the limited action of acids or acid substances or salts of heavy metals, particularly zinc, tin, copper, chromium or oxidizing agents such as halogens or tanning materials.

Elsner proposed products for blood-coagulation retarders which are obtained by extracting carrageen or agar with water at about 20 to 25° with addition of disinfectant, and evaporating the extract at below 50°C. The extract may be purified by dialysis before it is evaporated.

Gelatin is widely used in the form of sheets or as capsules for containers for pharmaceutical products. Thornley and Jones suggested a hardening method employing formaldehyde which was commonly used, followed by a solution of thiosulphate to inhibit the secondary hardening process which gelatin undergoes on storing after treatment with formaldehyde.

Many of the gum have been used as adhesives to maintain the shape and form of therapeutic tablets. Wershaw proposed gum arabic in connection with aluminum subacetate tablets. Coles, Barker, Robertson and Cowan employed agar as a carrier for penicillin solution. A mixture consisting of equal volumes of a penicillin solution of twice the final concentration desired and 1 per cent agar in distilled water or isotonic sodium chloride solution is a suitable preparation for local treatment. Penicillin in the agar base remains active for at least a month at refrigerator temperature and diffuses rapidly from the agar when applied to tissues. Bartsch used agar as an adhesive in nitroglycerine tablets for medicinal use. To 90 parts of lactose and 5 parts powdered [illegible] agar add a 10 per cent solution of nitroglycerin and dilute alcohol until the product can be granulated to go through a No. 15 sieve. Dry the powder, mix with 5 parts talc and pass through a No. 10 sieve; then compress it into tablets. Nitroglycerin is lost during drying and storage.

Hermann patented an X-ray contrast composition for increasing the concentrations of suspensions of such as barium sulphate for X-ray diagnosis. Preparations are described for suspensions containing 100 to 300 parts of barium sulphate, 1.4 to 4 parts of soluble salts of the acid contained in seaweed, algae, fuci, and kelp, and in some cases magnesium oxide.

Gresset suggested compositions for skin treatment such as skinrejuvenating compositions containing methyl cellulose, vegetable gelatin (agar), glycerol and water, with or without appropriate additions, such as pigments, waxes, or perfumes. The compositions melt at about 100 to 120° and solidify at about 35° to form a paste, which is removed from the skin after treatment.

Reviews of formulae employing sodium alginate in cosmetic preparations were made by Matthews. Frydlender, Jannaway and Schwarz gave a number of formulae for the use of seaweed colloids and the hemicellulose as well as the natural gums in cosmetic preparations.

Helfrich employed gum arabic in talc 99 lb. chalk 9 lb., and yellow ochre 15 oz. Eighteen lb. of the "colour vehicle" is mixed with 100 cc. of mineral the formation of a cosmetic compact in which a "colour vehicle" is formed of oil and with 1200 cc. of a dilute aqueous gum arabic solution and the mixture is used for making "wet-formed compacts."

[illegible] was employed as a [illegible] in French preparations in which protective pomade or cream contains soal 19, gum arabic 4, lanolin 2, glycerol 1 and water 74 parts. Gum arabic may be replaced by dextrin and lanolin by other oily substances.

Zakarits states that polysaccharide jellies (starch paste, glycerolated starch, gum tragacarth, etc.) can be preserved for a short time by the [illegible] chloride. Zakarias has found [illegible] of the magnesium chloride can be replaced by certain other inorganic [illegible] (iron, sodium, calcium, chloride, etc.) which form loose adsorption compounds with the carbohydrate constituent of the jelly, rendering it both sterile and stable. Such jellies are employed for colloidal ointments and cosmetics in the manufacture of toilet soaps.

Manufacture of Cardboard

THERE is a considerable quantity of cardboard used in the manufacture of high grade cartons and boxes for the packing of luxury goods, the brightness and cleanliness of the surface being an attraction in itself, but mainly because of the printing surface. The quality of the printing in the form of either decoration or advertisement on some of the boxes used for packaging is of a very high order.

Cardboard consists of cellulose fibres metted or felted into a coherent sheet. Usually a certain amount of loading is incorporated with the pulp to increase the weight and rended it smooth and less porous. The raw materials furnishing the fibre are wood pulp, etc. Old paper and the trimmings and waste from paper mills, and book-binders shops are also reworked. The common loading materials are china clay, talc, gypsum and barium sulphate.

In nearly every case the cellulose fibres must be freed from incrusting matter and treated in such a way as to reduce the substance to a state of minute subdivision and to isolate more or less completely the individual fibres.

MAKING WOOD PULP

Wood pulp is prepared by the soda process, the sulphite process, or by the sulphate process.

The soda process is largely used for soft woods, bamboos, etc. The bark is removed by hand shaves, but the knots and rotten wood are generally disregarded. The wood is put through a chipping machine which cuts it across the grain and reduces it to fragments about $\frac{1}{8}$th of an inch thick. After the chips are dusted by blowing them against a screen, they are filled to the digesters. When they are almost full the chips are covered with a caustic soda liquor of about 11°Be. They are boiled for 8 to 10 hours at a pressure of 90 to 120 pounds. The effect of this cooking is to reduce the wood to a soft mass. The non-cellulose matters of the wood are decomposed. The pulp and black liquor are blown out into a tank having a stopping bottom and covered with a closely fitted lid. Here the pulp is washed and the wash-waters are saved until their average density falls below 8°Be. The liquor is concentrated to 38°Be from which dry soda-ash is recovered. The pulp produced is soft and though of a dark colour, is easily bleached.

SULPHITE PROCESS

In this process, the wood is boiled under pressure with the sulphurous acid, or with acid sulphite of calcium and magnesium. The action of the sulphurous acid under pressure and at a high temperature upon the lignin and the other incrusting matters of the wood fibre is probably a hydrolysis, by this, these complex molecules are broken down, the resulting products being organic acids, soluble in the liquor. The acid sulphites react much like sulphurous acid, but the bisulphites combine with the aldehydes producing stable and soluble double salts. The acid sulphites tend to bleach the colour of the fibres by forming colourless compounds and the colour reappears on the finished paper. Hence for permanent whiteness the pulp is bleached with chlorine.

For making sulphite pulp, all bark, knots, and dead wood are cut out of the sticks, which are then chipped across the grain, as for soda pulp. The boiling is carried on by the "quick-cook". The

digester is completely filled with chips and all the liquor is run in as rapidly as possible. As a rule the liquor is about 7°Be with 3½ per cent sulphur dioxide. The pressure is raised slowly, in order to avoid the hammer effect of the live steam coming in contact with the cold digester content, and also to avoid too high a temperature before the liquor has penetrated into the interior of the chips; otherwise the wood may be burned, and rendered brown or red. The temperature should not exceed 300° to 312°F (149° to 156°C). It should be regulated by a thermometer, since no dependence can be placed on the pressure indications as a means of determining the conditions within the digester. During the 12 or 18 hours' boiling considerable gas is evolved, and there is a steady increase in the pressure, which reaches 80 pounds. Usually the pulp is blown out of the digester into a draining tank, where it is washed with pure water, pulp which is to be very thoroughly washed. since any bisulphite left in the fibre acts as an antichlor and destroys the bleach liquor.

PULPING STRAW

The pulping of straw may be carried out in two ways. One process involves simultaneous chemical and mechanical action on the straw. The process may be carried out at atmospheric pressure in open vessels at temperatures of about 95°C. Excellent board pulps can be produced by cooking wheat strand for one hour with 8 per cent caustic soda and 4 per cent sodium sulphite, whilst ½ hour sufficed to produce an easy-bleaching pulp for fine papers. Lower amounts of chemicals can be employed for strand employing ½ per cent sodium sulphite and 2½ per cent soda ash and cooking for 2 hours at 170°C. A yield of 50-52 per cent bleached pulp can be [illegible] usual soda, kraft or [illegible] The two processes are explained [illegible] detail below.

PULPING STRAW IN A HYDROPULPER

The straw is first chopped [illegible] 5 inches in lengths in an ensilage [illegible] and then dusted on a 20 mesh vibrating screen to remove dust and dirt. The cut straw weighing about 18 kgs is [illegible] put into hydropulper and its propeller is set in motion. Hot cooking liquor is added to the hydropulper. The cooking chemicals for fine pulps can be 12 per cent caustic soda or a mixture of 8 per cent caustic soda and 4 per cent sodium sulphite. (Ratio of liquor to straw = 9 : 1).

Straw for board may be cooked for 1 hour at about 95°C the temperature being maintained by live steam. The pulp is then removed and washed, and defibred in a heater. The yield and physical properties of such pulps are very suitable for board making.

Straw for fine papers may be cooked for only ½ hour. At the completion of pulping the nodes and rachises are softened. but not disingrated and they have only a few fibres clinging to them. The pulp is removed for washing and then returned to the hydropulper and recirculated with water. The pulp is fairly completely defibred by this treatment and required no further defiltering before screening. The nodes, grain, and rachises are almost completely removed by riffling, followed by screening on an 8-cwt screen plate. The pulp can be bleached by a single stage or multistage process to give 50-52 per cent yields of bleached pulp.

PULPING STRAW BY THE NEUTRAL SULPHITE PROCESS

The straw is chopped and blown through a revolving screen and cyclone

rotary digester, preferably stainsteel clad. Use of a steam chip and spraying the straw hot cooking liquor as it into the digester charges. straw is cooked with 8 per cent sodium sulphite and 2½ per soda ash (on dry straw) at a liquor ratio of 7 : 1 for 2 hours at 170°C.

The pulp is blown at 3 atmospheric pressure and washed in diffusers, or on filters since the pulp is free draining. After screening and deckering, ached pulp yields of 52-55 per cent obtained. The pulp can be bleached 70 per G.E. brightness with 5-7 per chlorine in a single or three stage process to give yields of 50-52 per cent. The 3 stage bleach is preferred and for the second stage it is recommended that sodium sulphite and soda ash be used in of caustic soda to avoid hydrating pulps.

MAKING THE BOARD

Having prepared the different kinds pulp we now proceed to manufacture cardboard. The cardboard-making process is chiefly mechanical. It is that the water used should be and colourless.

The simplest type of machine for the purpose is the singlemachine. It works as follows :—

The pulp is pumped from the stuff thence through shutes to the It then flows to a large wooden trough, in which revolves a large cylinder, hollow in the centre at the ends, and with a coverfine-mesh machine wire cloth about backing wire.

As the cylinder revolves about immersed in the stuff, the water in which the fibres are suspended rushes through the meshes of the wire. As, however, the meshes are too fine to allow the passage of the fibres the latter cling to the surface of the wire drum, and thus a thin fibre of fibres is formed on the revolving mould.

As the drum moves round towards the top, the film of stuff is lifted clear of the stuff and water in the vat and more water drains away. When the wet film reaches the highest of the circumference of the roll, it comes in contact with the endless travelling wet felt. As the web touches the wet felt it is conched by means of a felt-covered wooden roll, which presses the travelling felt against the surface of the drum. In this way the wet film of pulp is picked up from the wire surface and adheres to the felt.

The felt carries it along to squeezing or press rolls, where it is relieved of as much water as possible. The web sticks to and is wound round and round the top press roll until a sufficient thickness has been formed. It is then cut off by hand, laid in a pile, pressed and finally dried by hot air.

The resulting paper is known as a board, and such boards are used for boxes, panels, suitcases, etc. More modern machines are provided with drying cylinders and calenders for drying and glazing the board as it is made.

By using two stuff chests, two sets of stainers and two vats, a board can be made of two different qualities or colours, that is to say, it may consist of brown paper stuff on one side, and have a white top side, made of sulphite pulp, or of stock of any colour. Such paper is known as duplex, which means that they are two-sided. The width of the web which is to be made on the drum is regulated by stopping up the meshes of the wire by tapes, which may be wound on at either side. This obviously has the effect of closing the meshes of the wire cloth, so that water cannot run

of a web of fibres.

The water which passes through is run away to a back water box, whence it is pumped back again for further use in furnishing the beaters. The thickness of the web which will form on the cylinder is obviously limited, for, as it becomes thicker, less water can pass through, and so the number of fibres deposited becomes less. The thickness of the various webs which form the board is regulated by the consistency of stuff going to the vat, and by the speed of the machine.

In order, however, to produce a thick board, suitable for making folding boxes, or a paper which has to be very thick and stiff, the number of vats and making drums may be increased to four or even six or eight, and all the webs pressed together to form one thick sheet.

In this way, boards may be made with a different coloured surface on each side and with a middle of entirely different colour and quality. To do this different sets of beaters will be employed and also a number of stuff chests, mixing boxes, and strainers, to correspond with the number of qualities of stuff to be used to compare the finished board.

Each chest requires a separate stuff pump, and where stocks or different colour are being used, separate back water boxes and pumps are needed to pump back water from the vats for the mixing boxes.

To take the case of a machine, the vats are arranged together, and in rotation, the first to deliver its web of stuff to the being the one nearest the presses, so on in a reverse direction towards the strainers. When the fourth web has been picked up the felt will be heavily loaded, and here it rounds a roll and travels back towards the presses, the machine carrying the four-ply web on top and immediately above the

The presses at first are small and fairly light, and are placed in rotation in steps, leading down to the main heavy press roll. These small presses are generally called "baby" presses and they serve to squeeze and incorporate the four webs of paper together gradually before the main pressure is applied by the heavy press.

The majority of papers made on board machines are either duplex or triplex, the former having as a rule, a face of pure sulphite and a back of a mixture of mechanical pulp and waste papers; the proportions being 25% face and 75% backing.

In the case of triplex boards the usual finish is face and backing, with a middle of poorer quality, such as straw-boards and mixed waste papers.

Scientific Researc[h] and Inventions

[MANU]FACTURE OF ETHYLENE FROM [AL]COHOL

Studies conducted at the National [Ch]emical Laboratory of India Poona, [o]n a number of Indian bauxites and [a]ctivated aluminas have shown that [t]wo of indigenous bauxites compare [we]ll with the best activated aluminas [i]n the market for use on the dehydra[tion] of alcohol for obtaining ethylene. Ethylene forms the raw materials for the manufacture of a large number of [ind]ustrially important chemicals such [a]s ethylene glycol, ethylene dichloride, vinyl chloride ethanolamines, ethylene [o]xide, polythene and styrene. Coal gas, [co]ke oven gas, refinery gases and certain petroleum fractions are the usual [so]urces from which ethylene is manu[fa]ctured. Ethyl alcohol is an important [a]lternative source, particularly when the above materials are not available [in] adequate quantities. India has a [la]rge installed alcohol manufacturing [c]apacity and alcohol can, therefore, be [consi]dered a potential starting material [for] the manufacture of ethylene and its [de]rivatives. Ethylene is produced from [al]cohol by dehydration using either [ac]tivated alumina or bauxite as [cat]alysts. Since the special alumina [re]quired is not indigenously manufac[tur]ed and is expensive it is stated that [it] is desirable to find suitable Indian [bau]xites to serve as catalysts.

[CH]ASSIS FOR HEAVY TRANSPORT IN [DI]FFICULT TERRAIN

A factory in Amsterdam (Holland) [has] put on the market a new type of [tr]uck chassis which meets the severest [d]emands and can stand up to any amount of rough handling. [...] chassis has three driven axles. [...] vided with a wheel for pulling u[p] The two rear axles form a bog[ie sys]tem of the factory's own design [...] central bearing axle is designed i[n] a way that only a bronze bearin[g] is subject to wear, but of the [...] axle and of the bogie is precluded [...] braking device is operated [...] hydraulic air system; moreover [...] is a hand brake for the four rear [...] In order to facilitate driving [...] difficult terrain, the steering [...] provided with an air pressure [...] motor (patent pending), which [...] once upon any slight turn of th[e] [steer]ing wheel. The driving motor [...] cylinder four-stroke diesel eng[ine] 120 h. p. at 2,000 r.p.m., with a [maxi]mum couple of 48 kg-m at 1,000 [...] It is provided with a 3 h.p. [...] starter, a 12 V. 200 W. dynamo [...] 2-cylinder piston compressor. [...] used as a track, at 15 tons [...] weight the maximum gradient [...] taken it: 55.8 per cent. at ma[...] couple and a speed of 1.93 kilo[metres] (1.2 miles); 48.2 per cent. at ma[...] r.p.m. and a speed of 3.46 kilo[metres] (2.15 miles). As tractor, with a [...] weight of 28 tons, the maximu[m gra]dient to be taken is: 26.1 kilo[...] 23 per cent. at maximum r.p.m[...] a speed of 3.46 kilomeres.

SELF-SHARPENING SAW BLADES

A circular blade for powe[r ...] that cuts spinning in either di[rection] and sharpens itself while it wor[ks has] been developed by Silk Corpora[tion] Chicago. The blade rotates [...]

pposite direction, the cutting edges sed in the original rotation are auto-atically honed to new sharpness. The anufacturer says that the two-way it and the self-honing are the results f a new design for saw teeth.

LOATING WATER-PURIFICATION PLANT

A floating purification plant which akes pure water more easily avail-ble to outlying communities in many arts of the world has been developed y a British firm. The plant takes in ater from the river on which it floats nd pumps the purified water to earby villages by a pipeline. A feature f the unit, which is constructed of ght aluminium alloy, is its mobility. t can be towed up or down street to upply a village or an area in need of s services. The first full-scale plant, hich can pump 2,400 gallons of pure ater per hour up to a shore level of) feet, will arrive in Iraq towards the d of the current year. The plant has een constructed by a subsidiary of nperial Chemical Industries (Marston xcelsior Ltd.) in conjunction with a nsulting engineer who is well acquain-d with water-supply problems in sia.

RONGER ALLOY FOR JET ENGINE LADES

A new and stronger alloy for jet gine turbine blades has been develop-l by the Pratt and Whitney Division United Aircraft Corporation at atford, Connecticut, U.S. The alloy about 50 percent. nickel with varying nounts of chromium, cobalt, molyb-num, titanium and aluminium added. e development of the new alloy was ... encountered at temperatures of [illegible] degrees Fahrenheit. A stronger materi-al was also needed to withstand the tremendous outward pull to which the turbine blades are subjected. When revolving at full speed, each turbine blade is subject to an outward pull equal to about 25,000 times its own weight. This is equivalent to having an average-sized automobiled hanging from the tip of each blade.

ATOMS TO CHECK PLANT DISEASE

Radioactive atoms have success-fully checked a fungus-caused plant disease in experiments that may open the way to new and extremely valuable peace-time uses for the atom. Resis-tance to the disease called fusarium wilt has been increased 50 per cent. in plants that have been exposed to small amounts of atomic radiation. The experiments are being conducted by Dr. Paul Waggoner, Plant Pathologist at the Connecticut Agricultural Ex-periment Station, New Haven, Con-necticut, under contract with the U.S. Atomic Energy Commission. In the future it is said that it may be possible to irrariate many farm crops to protect them against wilt disease for which no good controls are now known. Small plants be treated simply and inexpen-sively. The resistance to disease has been produced without changing the plants genetically. Previous experi-ments had developed disease protection in plants only by the development of genetic mutations.

NEW BLAST CLEANING DEVELOPMENT

A development for the blast clean-ing type of process, in which [illegible]

... compressed ... is ... the ... by high pressure air against an ... to be cleaned has resulted in the ... ion to the Australian market of a compact unit, made by a local manufacturer. It comprises a revolving circular table which may be swung in and out of a cabinet. The blasting takes place inside the cabinate and can be watched through observation windows. One of these devices is being used in Melbourne for the cleaning and decarbonising of aircraft jet engine components of weight up to three cwts. Abrasives from 60 to 1,000 mesh may be employed, enabling varying degrees of finish to be obtained in the cleaning of precision components without significantly affecting critical dimensions. The unit is of all-welded steel construction, and the interior of the cabinet is rubber-lined to resist abrasion. Powerful lights assist in the inspection of the treated article as the work is proceeding.

INSULATED CONCRETE FLOORS

A simple method of preparing an insulated floor has been worked at the Central Building Research ... Roorkee. Ordinarily concrete ... consist of concrete slabs laid on grou... There is no air space left between ... ground and the slabs. The floor, th... fore is cold in winter and hot in summ... The floors prepared according to ... new method are warm in winter ... and cool in summer. These floors ... be utilised in places which carry c... paratively lighter weight. The pl... wherein such a floor is to be laid is ... up a few inches and levelled. Sc... sand is mixed in the upper layer. ... piece of gunny cloth is stretched o... it and, at regular intervals, narr... holes are made with the help of an i... bar. These holes are filled up w... fine concrete. When all these suppo... are ready, the gunny cloth is moiste... and about an inch thick layer of c... crete is spread over it. If some ex... strength is required, a sheet of ... wire netting can be embedded in ... layer. As time passes, the earth un... the floor, it is said, sinks and an ... cavity is created.

UNIVERSAL EMBROCATION

Cotton seed oil	15 oz.
Oleic acid	10 dr.
Eucalyptus oil	2½ oz.
Solution of ammonia	12 "
Oil of turpentine	7½ "

UNIVERSAL LINIMENT

Oil Sassafras	4 dr. 10 drops.
Oil Camphor ess.	2½ oz.
Oil of Thyme	3 dr. 20 drops.
Methyl Salicylate	100 mins.
Oil Terebinth	10 oz.

Mix and add colouring matter, if required.

ANAESTHETIC LINIMENT

Anaesthetic ether	1 part.
Chloroform	1 "
Alcohol (90 per cent.)	1 "

CHAULMUGRA OINTMENT

Chaulmugra oil	10 parts
Hard paraffin	40 "
Soft White paraffin	50 "

SCABIES SULPHUR OINTMENT

Sublimed sulphur	1 part
Benzoated lard	9 parts

SCURVY OINTMENT

Boric ointment	1 part
Carbolic ointment	2 parts
Zinc ointment	3 "

IODINE OINTMENT

Iodine	4 gms.
Potassium iodide	4 "
Glycerine	12 "
Lard	80 "

Triturate the iodine, potassium porcelain mortar; add the prepared lard; mix thoroughly by trituration.

It is an excellent friction ointment in goitre, and in enlarged glands or tumours.

STAINLESS IODINE OINTMENT

I

Iodine, immediately coarse powder	50 grams
Paraffin	50 "
Oleic acid	200 "
Petrolatum	700 "

Dissolve the iodine in the oleic acid by the aid of heat. not exceeding 70°C. Add the paraffin and continue heat and stir frequently until it shows by the absence of a reddish colour, then add the petrolatum, and when all is liquefied remove from the heat and stir frequently until it congeals.

II.

Iodine	5 grams
Groundnut oil	15 c.c.
Yellow soft paraffin to make	100 grams

Mix the iodine with the groundnut oil, add the yellow soft paraffin and heat gently, with occasional stirring, at a temperature not exceeding 60°C until complete combination is effected, as indicated by the disappearance of the brown colour.

BEDSORE DUSTING POWDER

Borax	2 dr.
Zinc oxide	2 "
Starch	3 "

BEDSORE OINTMENT

Borax	1 dr.

COMPOUND RESORCINOL OINTMENT

Resorcinol	60	grams.
Zinc oxide	60	"
Bismuth subnitrate	60	"
Birch tar	60	"
Petrolatum	250	"
Yellow beeswax	100	"
Wool fat	280	"
Glycerin	130	"

Mix the beeswax and wool fat in a dish or a water bath. Rub the zinc oxide and bismuth subnitrate with the petrolatum until smooth and add it to the melted mixture. Dissolve the resorcinol in the glycerin, incorporate the solution with the warm mixture, just prepared, then add the oil and stir the ointment until it congeals.

It is an excellent cure for ringworm, eczema, itches, and other skin diseases.

MERCURIAL OINTMENT

Mercury	1	lb.
Lard	12½	oz.
Suet	½	"

Rub the mercury with the suet and a little of the lard until gobules are no longer visible; then add the remaining lard, and triturate all together.

This ointment is chiefly used to introduce mercury into the system when the stomach is too irritate to bear it; it is used in syphilis, lupatic affections, etc.

COMPOUND PHENOL OINTMENT

Phenol	28	grams.
Mercuric nitrate ointment	63	"
Sublimed Sulphur, finely sifted	9	"
Olive oil	18	"
Yellow beeswax	18	"

Heat the olive oil with the sulphur until a reddish-brown liquid is obtained, dissolve the beeswax in the mixture, stir until nearly cold, then add the phenol, stir until dissolved, and mix with the strong mercuric ointment.

MARCUSSEN'S OINTMENT

Potassium Hydroxide	22.5	grams.
Sublimed sulphur	12.5	"
Yellow soft paraffin	22.5	"
Wool fat	22.5	"
Zinc sulphate	2.0	"
Sodium Hydroxide	0.8	"
Distilled water	51.7	c.c.
Benzaldehyde	0.5	c.c.
Liquid paraffin to make	100	grams.

Dissolve the potassium hydroxide in an equal weight of water, add the sulphur, boil gently until dissolved, and mix the solution with the yellow soft paraffin and wool fat. Dissolve the sodium hydroxide in the remainder of the distillel water, add the zinc sulphate, shake well, and incorporate the mixture with the ointment then add the benzaldehyde and sufficient liquid paraffin to produce the required weight.

It is detergent and stimulant., and is used in ringworm, itch, psoriasis, and some chronic skin diseases.

COMPOUND MERCUROUS CHLORIDE OINTMENT

Mercurous chloride	25.0	grams.
Mercuric oxycyanide	0.075	"
Wool fat	35.0	"
Yellow soft paraffin	25.0	"
Liquid paraffin	45.0	"

Melt together the wool fat, yellow soft paraffin; reduce the mercuric oxycyanide and mercurous chloride to fine powder and titurate them with a portion of the melted basis until smooth; gradually add the remainder, mixing thoroughly by trituration until cold. (Care should be taken to use dry ingredients and to avoid the inclusion of moisture).

It is useful in skin diseases.

Re[illegible] Manufac[illegible]

LAVATORY DEODARANT

Sodium bicarbonate	5	ounces
Alum	5¼	"
Potassium bromide	4	"

Hydrochloric acid enough.

Water enough to make 4 pints.

To 3 parts of boiling water add the alum and then the bicarbonate. Introduce enough hydrochloric acid to dissolve the precipitate of aluminium hydrate which forms and then add the potassium bromide. Add enough water to bring the measure of the finished product up to 4 pints.

DEODORISING KEROSENE OIL

Kerosene oil	100	parts.
Litharge	1½	"
Potassium hydroxide	9	"
Water	20	"

Mix and agitate with water in various proportions several times, allowing the water to settle and decanting.

KEYA KHAIR

Keya khair is prepared at home by the upper classes of people for domestic use. It is made into sticks about 6 inches long by 1 inch in diameter.

Soak 2½ seers of Janakpuri khair in sufficient quantity of water in an iron pan. When it has become soft, put the pan on fire and work the khair to a paste. Then incorporate the following spices :—

Seeds of cardamom	2	tolas.
Coriander seed	15	"
Aniseed	10	"
Carraway	5	"

Make them into a paste and spread it on the leaves of good bread kasra [illegible]. Then wrap up the leaves [illegible] that the mass is not exposed. [illegible] with fine twine and dry in [illegible]. Store in airtight tin pots.

LABEL PASTE FOR TINS

Wheat flour	[illegible]
Alum	[illegible]
Caustic soda	[illegible]
Water	32 [illegible]

Dissolve the alum and caustic [illegible] in the water, add the wheat flour [illegible] rub to produce a smooth paste, [illegible] heat, with constant stirring, [illegible] stiff paste results. By further [illegible] heating the paste can be reduced [illegible] powder, which is mixed with water [illegible] use.

LEATHER POLISH

Water	16	gallons
Stearic acid	6	lbs.
Triethanolamine	2	"
Carnauba wax	11	"
Turpentine oil	2	gallons

To the water add the triethanolamine and stearic acid and heat to boiling. In a separate container melt the wax in the turpentine and add the [illegible]. When it is of a temperature of about 80°C add to the first solution and [illegible] till cold.

MACASSAR HAIR OIL

Sweet Almond oil	24 oz.
Alkanet root	1 "
Origanum	1 [illegible]
Rosemary	1 "
Oil of nutmeg	15 [illegible]
Oil of neroli	6 [illegible]
Musk essence	4 [illegible]

Take the almond oil in a [illegible] put into it the alkanet root. Close [illegible] mouth of the jar and set aside [illegible]

[illegible] days. Then strain. [illegible] mix [illegible] ingredients in the order given in the recipe. Keep the oil for a fortnight when it will be ready for use.

MICA PAINT

Place in a crucible or retort some fragments of mica, make red hot and drop into water or boil in dilute hydrochloric acid. After either of the above processes it has to be ground in water and dried and powdered.

Now take 84 lbs. of this powder and 1 gallon of boiled linseed oil. Mix thoroughly. The paint is nearly transparent and is intended to be applied over other paint to produce a peculiar silvery or scaly glittering appearance, varying in different lights, and is very effective in certain classes of wood work. Small quantities of colour may be introduced into it but the best effects are obtained by its use over other colours.

NON-ALCOHOLIC HANDKERCHIEF

In preparing non-alcohol perfumes terpineol and benzyl benzoate are generally employed as solvents for essential oils. A few reliable recipes follow.

LILY OF THE VALLEY

Synthetic lily otto	50 parts.
Terpineol	40 "
Linalol	10 "
Synthetic musk crystals	2 "

Mix and put in stoppered bottle. Shake frequently until dissolved.

PIMPLE LOTION

Crystallised alum	1 lb.
Sodium chloride	1 "
Sublimed sulphur	1 "
Sugar candy	2 lbs.
Spermaceti	1 lb.
Rose water	3 lbs.
Distilled water	3 "
Alcohol	10 "

Reduce all the solids into fine powder and rub up with the mixed liquids. This lotion is to be applied at intervals during the day upon linen rags, which should frequently be charged. It is an effectual and quick remedy for eruptions on the face.

PLAYING CARD VARNISH

Gum elemi	56 lbs.
Methylated spirit	4 gals.

Dissolve. This is a colourless varnish especially suitable for playing cards. You need not add any other ingredients if you desire to make a pale varnish for your purpose then proceed as follows :—

Powdered pale Manilla copal	28 lbs.
Powdered rosin	56 "
Methylated spirit	12 gals.

POLISH FOR ALUMINIUM

Borax	4 oz.
Solution of Ammonia	½ fl.oz.
Water to make	4 pints.

DESTROYING RATS

Here is a poison that causes rodents to develop revenous thirst they go outside in search of water and usually die immediately after drinking it. The poison consists of barium carbonate, 1 part, mixed with bait, 4 parts. Fresh meat, cereal or cooked eggs are good baits, which should be mixed with enough water to make a mesh. Of course, the poison should always be placed where it is accessible to the rats only.

[WH]ITE SHOE DRESSING

432 P.K.R., Calcutta—Wants a [fo]rmula of white shoe dressing and [wa]terproofing paper and fibre board.

Lithophone	19	oz.
Titanium Dioxide	1	"
Shellac (Bleached)	3	"
Ammonium Hydroxide	¼	fl.oz.
Water	25	fl.oz.
Alcohol	25	fl.oz.
Glycerin	1	oz.

Dissolve the last four ingredients [by] mixing in a porcelain vessel. When [di]ssolved stir in the first two pigments. [K]eep in stoppered bottles and shake [be]fore using.

[W]ATERPROOFING PAPER AND FIBREBOARD

The following composition and [m]ethod of application will render [un]calendered paper, fibreboard, and [si]milar porous material waterproof and [pr]oof against the passage or penetration [of] water.

Paraffin (Melting Point about 130°F.)	22.5	oz.
Trihydroxyethylamine Stearate	3.0	"
Water	84.5	"

The paraffin wax is melted and the [ste]arate added to same. The water is [th]en heated to nearly boiling and then [vi]gorously agitated with a suitable [me]chanical stirring device while the [ab]ove mixture of melted wax and [em]ulsifier is slowly added. This mix[tu]re is cooled while it is stirred.

The paper or fibreboard is coated on [the] side which is to be in contact with [wa]ter. This is then quickly heated to [the] melting point of the wax, which then coalesces into a continuous [film] [which] does not soak into the paper ... preferentially wetted by the ... This method works most effect[ively] ... paper pulp moulded containers ... possesses the advantage of being ... cheaper than dipping in melted pa[raffin] as only about a tenth as much ... is needed. In addition, the ... the container is not greasy, and ... printed upon after treatment which [is] not the case when treated with ... wax.

PASTE FOR ATTACHING LABELS TO LITHOGRAPHED CANS

392 R.K.L.M., Lahore — Wa[nts] formulas of paste for attaching la[bels] to lithographed cans; adhesive [for] envelopes and marking ink.

Flour	[illegible]
Water	2 [illegible]
Glycerin	1 [illegible]
Nitric Acid	2 [illegible]
Methyl Salicylate	[illegible]

Make a smooth paste of the flour and water by the aid of heat, using an enamelled kettle and wooden paddle, add the glycerin, then the methyl salicylate, and then take off the fire. Add the acid while cooling.

This white paste does not become dry and will attach readily to nearly anything. It is always ready to use.

ADHESIVE FOR ENVELOPES

a.	Potato Flour	[illegible]
	Water	[illegible]
	Caustic Soda (37°Be)	3 [illegible]
b.	Nitric Acid (24°Be)	[illegible]
c.	Formaldehyde or Phenol	1 [illegible]

Heat (a) to clear solution, neutra[lise] with (b) and preserve with (c).

To get a more adhesive product, add ... of a solution of

Gelatin, Technical	3 kg.
Starch Syrup	2 kg.
Water	10 kg.

MARKING INK

I.

Dissolve

Unbleached Shellac	20 oz.

in a solution consisting of

Borax	30 oz.
Water	350 oz.

Filter while the solution is still hot. Then add to this solution another made up from

Water Soluble Nigrosine	10 oz.
Tannin	1 "
Picric Acid	1/10 "
Ammonium Hydroxide	15 "

This ink is especially adapted for laboratory use and produces a beautiful black that flows freely from the pen.

II.

Aniline Hydrochloride	6 g.
Dextrin	2 g.
Copper sulphate	4 g.
Glycerine, Lime-Free (sp.gr. 1.24)	1 g.
Water	to suit

CHROME TANNING LIQUOR

Sulphuric Acid Concentrated	5 lb.
Potassium Bicarbonate	6 "
Glucose	7 "

In making the above chrome tanning solution the bicarbonate is placed in a vessel, preferably of stoneware or ..., mixed with 12 parts of water. The sulphuric acid is added gradually and with stirring. Because of the great heat produced, the bichromate is readily dissolved. Next the glucose, dissolved in a small amount of the hot liquor is added very slowly. Much heat and gas is evolved because of the violent reaction which takes place.

CHROME TANNING OF SHEEP SKINS

I

For 800 lb. pickled sheepskins, the following quantities are used:

Temperature, 110°F.

Water	50 gal.
Salt	50 lb.
Hydrochloric Acid	1 gal.

The goods should be drummed in this liquor for 30 minitues. At the end of that time, 58 lb. of bicarbonate of soda dissolved in a small quantity of warm water, is added, together with $2\frac{1}{4}$ gal. of hydrochloric acid, and the temperature lowered to 94°F.

When yellow and thoroughly impregnated with chrome, which usually takes about two hours, the goods are horsed up for three hours, so as to fix the chrome. They are then thrown into a paddle wheel containing 110 lb. of "hypo" and 1 gal. of hydrochloric acid. After the wheel has been running 15 minutes, 4 gal. of hydrochloric acid diluted with 5 buckets of water, is run on slowly. At the end of one hour 50 lb. "hypo" and 2 gal. hydrochloric acid, diluted with 5 buckets of cold water, are added, and at the end of a further hour, 20 lb. "hypo" and $\frac{1}{2}$ gal. acid, suitably diluted, added and allowed to work for two hours, then the goods drained and washed in cold water for $3\frac{1}{2}$ hours (running water). They are always drummed in warm water, 100°F, for 20 minutes before next morning.

II.

Per 100 lb. Pelt:

Salt	10 lb.
Sulphuric Acid	1 lb.
Water	25 gal.

[illegible] 3 lb. bicarbonate, dissolved in a small quantity of water. Drumming is continued for two hours, or until evenly chrome. A solution of 15 lb. "hypo" in 10 gal. of water is now added to the drum and 5 lb. dissolved hydrochloric acid gradually run in, in small portions. There is really no need to neutralize the leather, but it must be thoroughly washed in running cold water. If goods are to be fat-liquored, then neutralization is advised. For liquoring should be carried out with olive oil and olive oil soap emulsions.

III.

Salt	36	lb.
Sodium Dichromate	33	lb.
Water	36	gal.
Hydrochloric Acid	2¼	"
Sodium Thiosulphate	68	lb.
Hydrochloric Acid	5	gal.

This is sufficient to tan 600 lb. pickled pelt.

GLACE KID TANNING

Per 100 lb. Pickled Skins:

Hydrochloric Acid	5	lb.
Sodium Bichromate	7	lb.
Sodium Acetate	1¼	lb.
Water	15	gal.

The skins should be horsed up for 12 hours after chroming and then struck out, horsed up for a further two hours and then reduced. It is preferable to give the skins a brief run in the "hypo" before adding the diluted acid. Chroming should be carried out in a drum and reduction in a paddle. There is no need to neutralize the goods after reduction, provided they are given a thorough washing for three to four hours in running water, cold, and finishing off in 100 F. for three quarters of an hour. Some tanners find that [illegible] and is therefore [illegible]

TANNING SNAKE SKINS

To start, cover the fresh skin [illegible] dry salt and let lie for two days. [illegible] soak until soft, and flesh the hide [illegible] moving any bits of meat or fat. [illegible] want the skin as a trophy, leave [illegible] scales on. To help tighten the [illegible] prepare a solution consisting of [illegible] part water, one part glycerine [illegible] one-quarter part thin carpenter's glue. Soak the skin in this for 10 minutes. Hang up to drain for the same length of time. Then wipe dry with a cloth.

If you expect to make a sort of leather to fashion into various articles, remove the scales.

Two formulas for tanning [illegible] recommended for amateurs. One is the standard sulphuric-acid pickle. It is mixed in the proportions of 1 qt. of salt and 1 oz. of sulphuric acid to 1 gal. of water. The acid must be commercial strength. If only the concentrated form can be had from the druggist, use only ½ oz. Leave the skins in this pickle for seven days.

The second formula is made in the proportions of 1 qt. of salt and 2 oz. of oxalic acid to 1 gal. of water. The time required is 12 hours. Stir the skins and turn frequently.

When they are removed from either of these acid solutions, rinse them well in clear water and put into a soda bath to nutralize any remaining acid. Mix one cup of washing or sal soda with 2 gal. of soft water and soak the skins in it for 4 hours. Rinse again, press flat with the scale side out, dry partially between layers of papers with a weight on top to prevent curling.

When skins are nearly dry, soften by drawing lengthwise across the edge of a ½ inch board. Do this until skin is prefectly dry. Dampen again and repeat, working until the skin dries soft. Then burnish the scale side by pressing it with a smooth iron. A flat iron is good but it must be cool. As the last step, polish with white shellac and alcohol.

OIL CLOTH

Oil cloth consists simply of fabrics coated with linseed oil, whiting and pigment, and are printed in oil colours in the usual way.

In order to prepare oil cloth, the linen or canvas should be covered with a liquid paste made in the following manner :—

Take pipe clay which has been completely cleaned by washing and shifting it from all impurities. It is then mixed with boiled linseed oil to which litharge is added in the proportion of 1 part of litharge to 4 parts of oil. The mixture is then boiled to the consistency of this paste, which is spread over the cloth or canvas by means of an iron spatula equal in length of the breadth of cloth. When the first coating is dry a second is applied. Sometimes the cloth becomes rough due to coarseness of the cloth as well as the unequal application of the paste. When this will happen the cloth should be covered with pumice and then rubbed with a piece of flannel moistened with water. When the last coating becomes dry, the cloth must be well washed in water and dried. Then a varnish composed of lac dissolved in linseed oil thinned with turpentine is applied to it. The colour of the varnished cloth thus produced is yellow but different tints can be imparted to it when any of the colours is added to the varnish as verdigris for green, umber for yellow colour, indigo and white for a light blue, etc.

HYDROGEN PEROXIDE

341 R.D.E., Bombay—Desires to know a process of manufacturing hydrogen peroxide and calcium oleate.

In order to obtain a pure aqueous solution of hydrogen peroxide, the pure hydrate barium peroxide is prepared first. For this purpose, commercial barium dioxide very finely powdered. is brought little by little dilute hydrochloric acid, until the acid is nearly neutralised. The cooled and filtered solution is then treated with baryta-water, in order to precipitate the ferric oxide, manganese oxide, alumina, and silica which are always present. As soon as a white precipitate of the hydrated barium dioxide make its appearance, the solution is filtered and to the filtrate concentrated baryta water is added, a crystalline precipitate then falls consisting of hydrated barium dioxide. This is well washed and preserved, in the moist state in stoppered bottles. In order to prepare hydrogen dioxide by means of this substance, the moist precipitate is gradually added to a cold mixture of not less than five parts of water to one part of concentrated sulphuric acid, until the mixture remains very slightly acid. The precipitate of barium sulphate is allowed to settle, and the liquid filtrate content can be precipitated by addition of dilute baryta solution.

A concentrated solution of hydrogen peroxide may be prepared by adding sodium peroxide to well-cooled diluted sulphuric acid (20 percent calculated amount). On standing about two-third of the sodium sulphate crystallises and is separated by filtration. The filtrate is distilled under diminished pressure (Merck). Merck's "perhydrol"

[illegible] 100 per cent. hydrogen peroxide contains 30 per cent. peroxide, one volume of the solution yielding 100 volumes of oxygen. If a concentrated solution of hydrogen peroxide be distilled under diminished pressure, water distils over first, and subsequently nearly pure hydrogen peroxide (96 per cent.) distils over.

CALCIUM OLEATE

To prepare calcium oleate make sodium oleate in the following manner :— Warm 1,217 grains of oleic acid to 60°C and add slowly 192 grains sodium hydroxide (90 per cent) dissolved in a mixture of 2 ounces distilled water and 6 drachms of alcohol, stirring constantly until acid is neutralised. Use phenolphthaline solution. Dissolve finally in 3 pints of water and filter. To this solution add 240 grains (fused anhydrous) calcium chloride dissolved in 1½ pint of distilled water. The granular precipitate of calcium oleate obtained in this manner should be washed with distilled water and dried.

RECOVERY OF SILVER FROM PHOTOGRAPHIC FIXING SOLUTION

312 R.S.P., Patna — Wants to know the process of recovery of silver from photographic fixing solution.

The usual fixing bath contains about [illegible]% by weight of fixing salt (sodium thiosulphate). The theoretical maximum [illegible]26 g. silver per liter in such a solution [illegible] rarely reached because with about [illegible]0 g. silver in solution, the bath is too weak for further use. According to [illegible], a solution of 10-15 g. of sodium sulphide (or of 6-8 g. of potassium sulphide) per liter of fixing bath has [illegible] applied. [illegible] the addition of [illegible] solution to precipitate [illegible] the (neutralized) fixing bath, [illegible] let the brownishblack sulphide precipitate settle out for a few days. Test [illegible] further precipitation by adding a [illegible] of the sulphide solution to the supernant liquid. When no further pricipitate forms, syphon off the clear liquor, [illegible] filter the precipitate on the bottom either by suction, or through a [illegible] cake, and dry on dishes in a drying oven.

The dried sulphide can then be reduced to metallic silver.

CLOTH PROOFING COMPOUND

348 C.D S., Travancore — Wants a formula of cloth proofing compound.

Latex (40%)	100	oz.
Casein (10% Solution)	1	"
Caustic Potash	1	"
Whiting	250	"
Gum Karaya (2% Solution)	4	"
Sulphur	5	"
Zinc Oxide	3	"
Ultra-Accelerator (P.P.D.)	[illegible]	"
Castor Oil	10	"

TYRE PUNCTURE SEALING COMPOUND

267 R.L.M., Amritsar—Wants a formula of tyre puncture sealing compound.

Asbestos (Fine Fibres)	25	lb.
Yellow Ochre	5	"
Ethylene Glycol (50-80%)	2	gal.
Water	2	"

Mix thoroughly and introduce into the tyre tube, under pressure, while the tube is inflated.

ARROWROOT

578 L.M.B., Calcutta—Wants to know the process of manufacturing arrowroot.

Arrowroot is a kind of starch obtained from the rhizome or tubers of Maranta arundinicea. For this purpose the roots are carried to the washing trough, which is fitted at its centre with a spindle having diagonally inserted legs of sufficient length. Here the roots are thoroughly cleaned of all foreign matters still adhering to them. They are then dropped from a hopper on to the grater, a large wooden cylinder covered with perforated iron sheets.

A stream of water pours upon this continuously from above, and the pulp and starch, held in suspension, pass on to a shaking sieve. From here the farina and water pass to another sieve leaving the pulp in the former sieve which is utilised as manure. The farina and water now make their passage into a large trough where the starch soon settles at the bottom.

When a sufficient quantity of starch has been collected in the last tank, it is allowed to settle firmly and the whole of water is gradually drawn off through a series of taps.

When the complete removal of water takes place, the surface of the residue will be found to be covered with a dirty slime. This is washed off and collected for pig food. Water is again poured into the tank and after agitating the farina it is allowed to pass through a fine silk sieve. After further skimming and washing, the product passes into a circular trough provided with an agitator, which revolves and thoroughly strips up the whole mass. Afterwards the product is allowed to settle and remove the circular trough and put into centrifugal machine to extract all possible moisture. Finally, it is taken to the drying ground, where it is exposed to the sun on frames covered with calico. When completely dry, the arrowroot which is now brilliantly white, it is bagged and put up for the market.

DISINFECTING FLUID

217 B.R.S., Burnpur—Wants to know a formula of disinfecting fluid.

Coaltar distillate (of sp. gr. exceeding 1.00)	100 parts.
Rosin	85 "
Caustic soda lye 30°Be	60 "
Vegetable oil	20 "
Water	200 "

Liquefy the rosin by the application of gentle heat, pour in the vegetable oil (castor oil, til oil, coconut oil etc.). Now raise the temperature of the mixture to about 100°C and stir in the caustic lye. Boil until saponified. Add water from time to time to make up the loss due to evaporation. Then make the soap solution by adding water little at a time until the whole water has been used up. Allow the solution to cool; when cold add the measured amount of creosote oil by continual stirring.

Reader's Business Proble[illegible]

[Reader's business problems will be discussed in these pages. We invite the[illegible] write us his difficulties. As the department is in charge of an experienced business[illegible] specially adept in dealing with such problems and to whom experiences of a large[illegible] of successful businessmen are available, his replies will lead the enquirer to a success[illegible] These replies will be published in the paper only and cannot be communicated by post.]

THE INSURANCE AGENT

3218 R.T., Bombay—I have been out of employment for the last two years and in spite of my best attempts I have not been able to secure a suitable job. Now I intend to be an insurance agent. Will you please advise me on the right line ?

The occupation of an insurance agent is both lucrative and respectable. The profits that successful men in the line make are quite decent and should attract worthy young men more and more. But the career pre-supposes zeal for work, able canvassing capacity and capable salesmanship. The work sometimes seems tiresome and the first few months are the most trying period in the life history of an insurance agent. Disappointments are met with more often than not and progress at times becomes heart breaking. The new agents are more likely to be faced with refusal as their cases are generally scrutinised carefully by the officials before they are accepted and their pleadings are generally dismissed without much importance being attached to them. A good man however with reliable parts need not be worried about the matter. What he should aim at is to study dispassionately the reasons for the refusal and act in light of the experiences gained till the number of refusals dwindle into an in significant figures.

A prospective insurance agent should before trying for an agency master the technicalities of the insurance business and should [illegible] a point to acquire a fairly good [illegible] the general business of insurance, [illegible] what facilities this business offers to the[illegible] pective customers. On being appoint[illegible] first duty of the agent should be to [illegible] prospectus and other business literature [illegible] company. Then acquaint yourself as [illegible]ly with the full history of the company [illegible] working as possible. A knowledge [illegible] affairs of other companies working in the [illegible] line is also covetable as this enables the [illegible] to discuss on solid grounds when the [illegible] other companies crop up. It requires [illegible] tion that the prospective agent however [illegible] select a company that has a good standing [illegible] is popular.

The aim of an agent is to make a [illegible] by tactful ability and efficient service. [illegible] should be in a position to explain why [illegible] convinced that the methods and rates of [illegible] company have advantages over those of [illegible] rivals. On the forceful and convincing [illegible] this point depends the success of the [illegible] not to a little extent. He should be [illegible] all the alleys in the local insurance affairs [illegible] by dint of his knowledge of rival institu[illegible] should be able to show how the policy [illegible] general conditions of one company are in [illegible] respects not so good for the customer [illegible] of the agent's company whereas in [illegible] respects they are less advantageous.

[illegible] of any kind within the scope of Industry are invited. Enquiries or replies from our [illegible] will be published free of charge in serial order. Questions are replied by post on receipt [illegible] Re. 1 stamps for each question. Subscribers outside India are requested to send eight International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

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557 S.B., Calcutta—Plastic machines may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta.

[illegible] B.S., Cuttack—For leather and skins of required description enquire of C. V. Ahmed & Co., P14, Bentinck Street; S. Lal Hussain, [illegible], Bentinck Street and Shekho Traders Ltd., [illegible], Colootola Street; all of Calcutta.

[illegible] A.N.M., Kottayam—Formulas of luminous paints will appear in due course.

[illegible] B.V.F., Khamgaon—You may dry the [illegible] in the sun and pack in air tight cans. For this you have to use vacuum packing machine which may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

[illegible] F.A.P., Bombay—To communicate with any querist write him with number and initials care of Industry when your letter will be duly redirected.

[illegible] B.R.K., Lucknow—For the machines you require enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta.

[illegible] I.A.K., Nagbhir—Process of manufacturing cardboard appears elsewhere in this issue.

[illegible] B.C., Ajmer—Process of manufacturing grinding wheel will appear in due course.

[illegible] S.G.F., Meerut—Potash lye is prepared [illegible] water to potassium hydroxide or [illegible] potash. Pearl ash is potassium [illegible] which may be had of Calcutta [illegible] Co. Ltd., 10, Bondfield Lane, Calcutta.

[illegible] K.A.C., Virudhunagar—Process of manufacturing benzoin cakes will appear in [illegible]. Process of manufacturing synthetic [illegible] not available.

[illegible] V.D., Kusunda—You may start [illegible] of boot and shoe lace, dhoop, etc. [illegible]. This work may be done by [illegible] of your family and others.

572 S.P., Bairagania—As far as our knowledge goes cheera is not manufactured by machine but by means of a dhenky.

573 G.P., Ratangarh—You may take up manufacture of soap with Rs. 5000/-. You have to engage one mistry who will be able to boil soap successfully and two other men as ordinary workers. You will require soap boiling pan, frame, cutting machine and stamping machine.

574 R.B., Darbhanga—Recipe of patent and proprietory medicines are not available.

576 M.S., Jodhpur—We have no book dealing with the manufacture of marble slabs and tiles.

577 K.V.R., Punukollu—You may consult Navin Bharat, Tilak Hall, Kanpur; Chand; 28, Elphinstone Road, Allahabad and Monmohan, Maya Press, Allahabad.

578 D.R.M., Banaras—Oils may be had of Adam Hajee Peermohamed Essack, 1, Amratolla Lane; Aloke Kumar Chakravarty, 49, Strand Road; Ananda Prasad Mallik and Anath Bandhu Samanta, 2, Burtolla Street and Hossein Kasam Dada, 25, Amratolla Street; all of Calcutta. Formulas of disinfecting fluid will appear in due course.

581 B.F., Bombay—Following is a formula of vinegar: Molasses 1 gallon; Acetic acid 4 lbs. Put the ingredients together into a cask of about 40 gallon capacity. Fill it with rain water; shake it up and let it stand from one to three weeks. Strain and bottle for use. Detailed process of manufacturing vinegar will be found in Home Industries published from this office, price Rs. 3/12/- including postage.

582 S.P.S., Darjeeling—For selling crude drugs you may communicate with the following firms: Banshidhar Dutt, 126, Khengrapatty Street; Bengal Herbs Stores, 2, Mullick Street; Indian Herbs Store, 31, Mullick Street; Kamala Bhandar, 163/B, Cotton Street; P. C. Dawn & Company, 1, Machuabazar Street and

[illegible] INDUSTRY

[illegible] 11, Portuguese Church Street; [illegible] of Calcutta.

584 H.N.M.J., Bombay—Formula of fly paper appeared in November, 1954 issue of Industry.

586 E.P.L., Karachi—Following is a formula of paper varnish: Mastic 12 oz.; Venice turpentine 2½ oz.; Camphor ½ oz.; Turpentine oil 40 oz. Dissolve the solids in the turpentine oil. Then strain through a cloth and bottle. Formulas of paint will appear in due course.

588 B.P.S., Shillong—Following is a list of mica merchants: Indian Mica Supply Co. Ltd., 95, Lower Chitpur Road; Dawn & Co., 1, Portuguese Church Street; Mica manufacturing Co. Ltd., 161, Muktaram Babu Street and Premier Mica Mining & Manufacturing Co. 2, Gopi Kristo Pal Lane; all of Calcutta. For mukvanica seeds and other indigenous herbs enquire of Banshidhar Dutt, 126, Chengrapatty Street; Indian Herbs Store, [illegible], Mullick Street and Bengal Herbs Store, 2, Mullick Street; all of Calcutta. For analysis you may enquire of Government Test House [illegible]lipur, Calcutta.

590 K.I.B., Pali—Pharmaceutical chemicals and medicines may be had of Butto Kristo Paul & Co. Ltd., 1-3, Bonfield Lane, Calcutta and Calcutta Chemical Co. Ltd., [illegible] Bonfield Lane; both of Calcutta. We have [illegible] book which contains manufacture of chemicals and medicines.

591 H.S.B., Amritsar—Process of manufacturing chinese blue will appear in due course.

592 L.R.D.S., Bombay—Formulas of luminous paint will appear in due course. An article on gramophone record manufacture will appear in due course.

593 G.K., Nagpur—For chicory enquire the following firms: Volkart Bros., Mangalore; Sujeer Anantha Nayak, Mangalore; [illegible] Martha Estates, Virupaksey, Mathurai and [illegible]ee Krishna Coffee Works, Chickmagalur, [illegible]oore. Chicory powder is mixed with [illegible]e powder. No other powder is mixed [illegible] coffee powder.

596 M.A.S., Lahore—We have no book [illegible] with the manufacture of musonite wood.

597 N.G., Calcutta—Following is a formula [illegible] nitrocellulose lacquer: Nitrocellulose [illegible] Shellac 5 lbs.; Plasticizer 20 lbs.; Alco[illegible] 17 lbs.; [illegible] 10 lbs.; Acetone 5 lbs.; [illegible] 5 lbs.; Mix and pack airtight. [illegible] a formula of thinner: Ethyl acetate [illegible] p.c.) 20 parts; Butanol 20 parts; [illegible] (98-100 p.c.) 40 parts; Methyl gly[illegible] 25 parts.

598 P.S.N., Madras—Process of [illegible] facturing tin slates will appear in due course.

603 S.R.S., Amritsar—It is not [illegible] to manufacture cardboard on a small scale. An article on manufacture of cardboard [illegible] in this issue of Industry.

606 S.R.S., Narnaul—Newar [illegible] machines may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

608 A.M.C.A., Tirunelveli—For plastic sheet cutting machine you may write to Alfred Herbert (India) Ltd., 13/3, Strand Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta. Wants to be put in touch with suppliers of plasctic sheets.

609 N.L.C., Bombay—Following is a recipe of chewing gum: White wax 1 part; Paraffin [illegible] part; Tolu balsam 4 parts; Benzoin 1 part; Sugar 1 part; Flavouring matter q.s. Melt the gums, etc. together and when fluid stir in the sugar and flavouring matter. When cool enough, roll into sticks or cut in dies.

610 S.S.K., Bhawanipatna—Reply to questions is generally published in these columns. But if you want that your reply should be sent by post you should remit Re. 1/- for each question. Annual subscription of Industry is Rs. 8/- and price of single copy is 12 as.

611 R.F.W., Colombo—Palm seeds are available in North Africa, East Africa and South Africa. Palm seeds are not available in India.

612 R.M.G., Delhi—Following is a recipe of film cement: Acetone 4 oz.; Ether [illegible]; Old film 6 inches. An article on boot polish manufacture will appear in an early issue of Industry.

613 B.D., Golaghat—You may start umbrella manufacturing with Rs. 10,000/- as initial capital. You have to purchase [illegible] umbrella handles and cloths from the market and assemble them to umbrellas. You will require sewing machine for sewing the cloth to required design. You may start poultry farm with Rs. 5,000/-.

[illegible] manufacturing [illegible] machines [illegible] of Oriental Machinery Supplying [illegible] Ltd., P-12, Mission Row Extension; [illegible] & Co. Ltd., 2, Fairlie Place and [illegible] Commercial Corporation, 61 Bow [illegible] Street; all of Calcutta. As regards [illegible] you may use edible colour which [illegible] be dissolved in gum mucilage. Finally [illegible]

[illegible] Y.J.R., Vijayawad—Address of Kiwi [illegible] Club is not known.

[illegible] S.A.J., Madras—Buckles are manu[illegible] by Azad Trading Agency, 1st Floor, [illegible] Street, Calcutta and Wajahat Baten Company, 98, Canning Street, Calcutta. For [illegible] making machines write to Alfred [illegible] (India) Ltd., 13/3, Strand Road and [illegible] Klein & Co. Ltd., 1, Royal Exchange [illegible] both of Calcutta.

619 U.I., Pabna—For securing import [illegible] you should write to the Controller of Import, Karachi. You may import Indian made machines from India but you cannot import [illegible] machines from India. The machines [illegible] require may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

620 P.T.M.C., Purulia—You may refer you[illegible] [illegible] to the Deputy Controller of Exports, [illegible] House, Calcutta. There is no such [illegible] where instruction is given regard[illegible] export business. Following is a list of [illegible] agents: American Express, Inc., 28, [illegible] Street; Banerjee & Co., 2-1, Roy Bagan [illegible]; East Asiatic Co. Ltd., F-2, Clive Bldgs., [illegible] Carrying Co. Ltd., 11, Clive Row; [illegible] of Calcutta.

[illegible] S.R.S., Calcutta—You may take up [illegible] of chalk crayons on commercial [illegible] with Rs. 2,000/- as initial capital. For [illegible] business you need not engage skilled [illegible]. Ordinary labour will serve your [illegible]. Mould may be had of Small [illegible] Mnfg. Co., 22, R. G. Kar Road, [illegible]

[illegible] E.L., Calcutta—We have no book deal[illegible] the manufacture of waterproof glue. [illegible] is a formula of plywood glue: Zinc [illegible] parts; Lime hydrate powdered 12 [illegible] sodium phosphate 7 parts; Sodium [illegible] parts; Calcium sulphate 10 parts; [illegible] parts.

[illegible] Tinnevelley—Following is a [illegible]: Musk 20 gr.; Ambergris [illegible] benzoin 20 oz.; Powdered [illegible] cinnamon 2 oz.; Powdered nitre 2 oz.; [illegible] Make a thin paste mucilage of tragacanth. Sticks are then made by dipping and taking out slowly thin wooden or bamboo splinters into this emulsion. Dry in the sun and store for use.

624 A.K.D.C., Calcutta—Following is a list of zarda dealers: D.C. Atar, Moti Chowk, Satara City; F.H. Zarda & Attar Factory, Thana Jagannath, Lucknow; H.S.T.M. Company, Post Box No. 7, Hindupur, M.S.M. Ry. and Pansugandha Karyalaya, Pansugandha Lane, Meerut City. Following is a list of hair oil dealers: Brahmaputra Trading Co. Ltd., Gauhati, Assam; Chitra Perfumery Works, Silchar, Cachar; B.M. Ahuja & Co., Chandi Chowk, Delhi; Mohan & Mohan, Post Box No.113, 30 Press Road, New Delhi; James Perfumery Co., 15, Wannels Road, Egmore, Madras; Lord's Chemicals, 8, Palaniadvar Street, Chintadripet, Madras and Pratap & Co., Pratap Bhavan, Kanauj.

625 C.H.R., Calcutta—Following is a list of fruit dealers: Apple Walnut Co., Baramula, Kashmir; Fairways, P.O. Box No. 51, Srinagar, Kashmir; Imperial Fruit Agency, Baramula, Kashmir; Leading Fruit Co., Srinagar, Kashmir and Newman's Fruit Mart, Srinagar, Kashmir.

627 C.H.S., Chandra—You may try the following recipe for joining wool to wood: Raw rubber 100 oz. Dissolve in a suitable amount of kerosene or naphtha to get proper consistency.

628 L.K.C., Mauritius—Following is a list of canned goods manufacturers: Daw Sen & Co., 29, Dr. Suresh Sirkar Road; Sree Kissen Dutt & Co., 128, Middle Road, Entaly; Tins Products Ltd., 18, British Indian Street; Ideal Fruit Preserving Co., 67, Badridas Temple Street and Imperial Preserving Co. 35A, Murari Pukur Road; all of Calcutta. You may consult Indian Pickles, Chutneys and Morabbas published from this office, price Rs. 3/12/- including postage.

629 R.N.A., Jharia—For coconut oil write to Baur & Company Ltd., 5, Upper Chatham Street, Colombo; Ceylon Produce Trading Co., P.O. Box No. 455, Colombo; Dodwell & Co. Ltd., P.O. Box 47, Colombo; Kerala Coconut Exporters Corp., P.O. No. [illegible] Cochin and T. Stanes & Company Ltd., Cochin S. India. For copra write to Ceylon [illegible] Co. Ltd., Australia Bldgs., Colombo and [illegible] [illegible]

Edited, Printed & Published by K. N. Banerjee for Industry Publishers Ltd.

Industr

MONTHLY MAGAZINE

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BY

V. L. N. ROW,

B. Sc. (Eng.), A.A.I.E.E., A.I. Mech. E., A.M.I.E. (I)

Written specially for

THE COMMON HOUSEHOLDER, THE AVERAGE HOUSEWIFE, FOR JUNIOR TECHNICIANS AS WELL AS THOSE IN THE TRADE OR WHO WANT TO ENTER IT.

INDUSTRY

A Monthly Magazine for Manufacturers and Businessmen.

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March Issue of Industry will contain many useful articles on commercial and industrial subjects such as Canning of Vegetables; Manufacture of Lithographic Inks and Pencils; Hair Tonic Manufacture; Manufacture of Soft Soap; Salting Butter; Foam Baths, etc in addition to the regular features such as Agricultural Tips; Scientific Researches and Inventions; Pharmaceutical Recipes; Recipes for Small Manufacturers; Formulas, Processes and Answers; Reader's Business Problems; Queries and Replies, etc.

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Industry

FOR MANUFACTURERS & BUSINESSMEN

VOL. XLV. | CALCUTTA, FEBRUARY, 1956 | No.

THE RAILWAY BUDGET

THE Railway Budget for 1955-56, presented by the Railway Minister, Sree Lal Bahadur Shastri in the Lok Sabha disclosed a net revenue surplus of Rs. 7.14 crores as against the revised estimates of Rs. 6.57 crores for the current year. The Budget for 1955-56 has been prepared in accordance with the provisions of the Revised Convention for the separation of Railway Finance adopted by the Parliament during the last session. An important feature of the new convention is that the annual contribution to the depreciation fund the Railway revenues has been enhanced from Rs. 30 to Rs. 35 crores.

The overall Gross Traffic Receipts for 1955-56 are estimated at Rs. 292.52 crores against the revised estimate Rs. 282.80 crores for the current year. The estimate of passenger earnings has been placed at Rs. 104.50 crores and that of goods earnings at Rs. 183.90 crores. The estimate of Ordinary Working Expense for 1955-56 has been placed at Rs. 206.59 crores, that is, Rs. 3.83 crores more than the revised estimate for the current year. After allowing for contribution to the Depreciation Reserve Fund in accordance with the Revised Convention and payment of dividend to General Revenues, the net surplus that may accrue in 1955-56 is estimated at Rs. 7.14 crores, as against the revised estimate of Rs. 6.57 crores for the current year.

As the Railways are reaping a succession of surplus budgets it is likely natural for the railway users to expect some relief in fares and freights. With a view to giving some relief to long-distance passengers Sree Shastri has decided to reintroduce the telescopic basis of fares. The re-adjustment of fares he proposes is on the basis of a telescopic fare structure of three legs, the first up to 150 miles, the second from 151 to 300 miles and the third 301 miles and over. The existing basic

fares in respect of the Second, Inter (to be known as First and Second from April 1 next) and Third classes will remain unchanged for the second leg. The fares for journeys in the third leg of 301 miles and over have been reduced while the fares applicable to the first leg, namely, 1 to 150 miles, have been slightly enhanced. It will be thus seen that while long-distance passengers for instance, passengers travelling from Delhi to Madras or from Calcutta to Bombay, may get slight relief all short-distance passengers will have to pay more for journeys not exceeding 300 miles.

In course of discussion in both the Houses of Parliament Sree Shastri has modified his Budget proposals by making three important concessions. First, there would be no increase in fare in the case of third class passengers travelling by ordinary passenger trains within a radius of 50 miles. Secondly, the surcharge of 12.5 per cent on freight for all consignments less than 20 maunds has been reduced to 6.25 per cent. Thirdly, the minimum freight for "smalls" would remain at the existing basis of Re. 1/-, instead of the proposed Rs. 1/8/-.

These concessions imply substantial gains to a large section of passenger and trading public. The fare concession is expected to benefit nearly 90 per cent of all passengers travelling by passenger trains. One important result of this announcement is that there will be no increase in suburban single tickets and there would be no increase in ordinary season tickets, in student or vendor's season tickets, whether on the suburban or non-suburban sections.

The importance to be attached to the policy of selfsufficiency in the production of rolling stock requires no emphasis. Manufacture of locomotives, coaches and wagons in India means augmentation of employment opportunities for India's unemployed millions. According to the Railway Minister, the implementation of the policy of self-sufficiency in railway equipment and supplies "has progressed satisfactorily". The Chittaranjan Locomotive Works have already turned out 200 locomotives. The production capacity of the Works is being increased to 200 locomotives. The Telco have been advised to increase their production from 50 to 75 metre gauge locomotives. The Perambur Integral Coach Factory is expected to go into production in the course of the Budget year. Wagon building is by large confined to the private sector. The Railway Minister disclosed that he had given an assurance to wagon builders of the Railways' willingness to purchase 12,000 wagons a year for five years.

The Five-Year Plan for the Railways provided for an expenditure of only Rs. 400 crores out of an aggregate investment of over Rs. 2 200 crores under the overall Plan. The Railways have already an expenditure of nearly Rs. 291 crores. Sree Lal Bahadur Shastri is confident that the Railways would be able to spend the total amount of Rs. 400 crores by the end of the Plan period (1955-56). The targets are being just achieved, not exceeded. Sree Lal Bahadur Shastri told the Lok Sabha that a planning Cell had been set up in the Railway Board's office and placed under the charge of a special officer. The Cell's task will be to formulate the Railways' Second Five-Year Plan.

INDUSTRIAL CREDIT AND INVESTMENT CORPORATION

The Industrial Credit and Investment Corporation was registered under the Indian Companies Act on January 5, 1955. The authorised capital of the Corporation is Rs. 25,00 00,000 divided into 5,00 000 ordinary shares of Rs. 100/- each and 20,00 000 unclassified shares of Rs. 100/- each. The subscription list of the present issue of 5,00 000 ordinary shares will open on February 3, 1955 and remain open till February 14, 1955. The Central Government shares comprised in the present issue to be approved investment for the purpose of Section 27A of the Insurance Act. Several Indian Banks and Insurance Companies and certain Directors have agreed to take up 2,00,000 shares of the present issue. Corporations and individuals in America have agreed to take up 50 00 Shares and British Banks etc. 1,00,000. The remaining 1 50,000 Shares are offred for public subscription.

MANUFACTURE OF RAILWAY EQUIPMENTS

The Government of India has decided to set up a committee, with Mr. G.B. Kotak as Chairman, to advise it on the more intensive utilisation of indigenous capacity for railway equipment, particularly for the manufacture of special types of wagons, narrow-gauge locomotives and other stock and fittings used on railways, which are still imported. The terms of reference of this Committee will include problems relating to self-sufficiency in the production of railway equipment to the maximum extent possible. It will specifically locate idle capacity in India for the manufacture of railway equipment and rolling stock which are at present imported; and suggest ways and means of expanding the existing plants and/or of setting up new industries in India for producing items of railway equipment which cannot at present be manufactured with the existing resources.

CENTRAL PLAM GUR TRAINING SCHOOL

The Central Plam Gur Training School has been shifted from Cuddalore to Dahanu Road in Thana district, Bombay State. The school it will be recalled was started in August, 19[illegible] and is run by the All-India Khadi and Village Industries Board. Since its inception, about 400 trainees from different parts of the country have been trained in the art of making plam gur, improved methods white sugar confectionery, etc. The problems facing the industry, such as saving in fuel consumption, preservation of palm juices, improvement in quality of gur, are being tackled in the research laboratory.

PROTECTION TO CAUSTIC SODA AND BLEACHING POWDER

The following Press Note, dated the [illegible] January 1955, has been issued by the Government of India in the Ministry of Commerce and Industry:—

The Government of India's Resolution on the Tariff Commission's report on the caustic soda and bleaching powder industry has been available at present.

Government have accepted the following scheme of protection recommended by the Commission :—

The existing preferential rate of duty of 28.3 per cent ad valorem on caustic of U.K. origin should be converted into a protective duty, the standard rate of duty being fixed in accordance with the relevant trade agreement. In regard to bleaching powder and bleaching paste, a protective duty of 15 per cent ad valorem should be levied. The protective duties mentioned above should be in force upto the end of 1958.

A notification has been issued separately bringing into force the protective duties mentioned above.

Government have taken note of various ancillary recommendation for the future expansion and development of this important heavy chemical industry on sound lines. These recommendations are being examined by Government.

Government have drawn the attention of the industry to the Commission's recommendations urging the industry to intensify its efforts to develop new uses for chlorine, to improve the strength and stability of bleaching powder, to remove defects in the quality and packing of caustic soda, etc.

PROTECTION TO THE AUTOMOBILE SPARKING PLUG INDUSTRY

The following Press Note, dated New Delhi, the 22nd January 1955, has been issued by the Governmeit of India in the Ministry of Commerce and Industry :—

The Government of India's Resolution on the Tariff Commission's Report on the Automobile Sparking Plug Industry has been published on the 22nd January 1955 in the Gazette of India Extraordinary.

The Commission's inquiry covered all specifications of sparking plugs in 14 mm. sizes including resistor types, but excluding integrally screened types.

The Commission has stressed the need for creating favourable conditions for the growth of this nascent industry by affording adequate protection so that the industry may have the necessary incentive for implementing fully its phased programme of production of this important automobile component.

Government have accepted the Commission's recommendation for grant of protection to the industry till the 31st December, 1955. A protective duty of 92½ per cent ad valorem (standard) will be levied on sparking plugs of all specifications and sizes mentioned above, and parts thereof, adapted for use in motor vehicles other

[illegible] and a preferential duty of 55 per cent ad valorem will be levied on such sparking plugs and parts thereof of United Kingdom origin adapted for use exclusively on motor trucks. Notifications giving effect to the protective duties referred to above have been issued separately.

Government have been unable to accept the Commission's recommerdations for affording additional relief to the manufacturers by way of refund of duty on imported raw materials and components, because in estimating the quantum of protection the customs duty payable on imported raw material has been taken into account.

Government have accepted certain other ancillary measures of assistance to the industry suggested by the Commission.

ADMINISTRATION REPORT OF THE PORT OF CALCUTTA FOR THE YEAR 1953-54

The Administration Report of the Port of Calcutta for the year 1953-54 reveals the following features :—

The revenue receipts of the Port Commissioners for the year under review were Rs. 8,17.72,566 as against Rs. 8,68,843 in the previous year.

The net expenditure for the year amounted to Rs. 9,00.38,794 as compared to Rs. 8,31.40,064 in the previous year. The year ended with a deficit of Rs. 82,66,228 which was met from the Revenue Reserve Fund. The actual working expenses during the year amounted to 110.11 per cent of the income as against 95.75 per cent in the previous year.

[illegible] Fund as in the [illegible] ed to Rs. 3.6 crores. The [illegible] Fund had a closing [illegible] lakhs on the 31 March [illegible] balance in the Vessels [illegible] Fund on that date amounted [illegible] lakhs.

The total tonnage of [illegible] exports which passed through [illegible] during the year was imports [illegible] and exports 5.336,037 as [illegible] corresponding import and export [illegible] of 3,319,018 and 6,354,058, [illegible] in the previous year. There [illegible] noticeable decrease in the total [illegible] passing through the Port.

The number of vessels that [illegible] the Port during the year was [illegible] against 1,503 in the previous year [illegible] the total gross tonnage decreased [illegible] 8, 873, 891 to 8,611, 388. The [illegible] draft ship to enter the Port during [illegible] year was drawing 27'-½" forward [illegible] aft and the deepest draft ship to [illegible] the Port was drawing 27'-6" [illegible] and aft.

In the Port Approaches, the [illegible] Bar controlled the draft of ships for [illegible] days as against 163 during the previous year. The Eastern Gut was the controlling bar for 34 days as against 112 [illegible] during the previous year. The [illegible] Bight controlled the draft of ships [illegible] 69 days during the previous year [illegible] the Ninan Reach for 34 days as against 11 days during the previous year. The controlling bars were thus [illegible] Diamond Harbour for 137 days [illegible] against 202 days during 1952-53 and [illegible] days during 1951-52.

The income from Pilotage during the year was Rs. 24,74,[illegible] and [illegible]

[illegible] Rs. 23,80,532 showing a [illegible] of Rs. 9,16,204. A sum of Rs. [illegible] was appropriated from the General Revenues to cover the deficit in the Pilotage account.

DOUBLING CAPACITY OF ROURKELA PLANT

Plans are already afoot for doubling the capacity of the Rourkela plant. This will be achieved with the setting up of the present 500,00-ton ingot plant, so that a million-ton production can be obtained without any difficulty.

Representatives of Krupps-Demag have been asked to produce another report within two months from now, advising the Government how this objective can best be carried out.

The final project report of the first stage of the works, which the Government is examining, shows that it will be necessary to set up a coke oven plant, a blast furnace plant, steelworks and lime burning plant, besides a rolling mill.

As it may be difficult to consume all the rolled strips that the mill is capable of producing, it is proposed to diversify the end product when the mill capacity is doubled.

The rolled products in the first stage, according to the final report, will comprise heavy gauge plates, [illegible] tons; medium gauge plates, [illegible] tons; strips, 72,000 tons; and [illegible] sheets, 110,000 tons.

The Rourkela plant will be fed from the iron ore deposits of Taldih which German experts consider are the best available in the vicinity. Approximately 60,000 tons per annum of manganese will also be required in the first stage besides much limestone and dolomite.

The water required for the works will be obtained from the Brahmani River, while electric power, amounting to 40,000 k.w., will be available from the Hirakud hydro-electric power plant.

The mill, in the first phase, will employ about 9,000 persons. After its expansion to a capacity of approximately one million tons of steel per annum, the number will rise to 15,000 workers and employees of all categories.

EXPORT OF QUALITY RICE FROM INDIA

India will be able to export 200,000 to 300,000 tons of quality rice this year to the U.K., Singapore, Formosa and some of the Middle Eastern countries. Mr. K.V. Krishnappa, Union Deputy Minister for Food, told Pressmen.

He said there was now good demand for quality rice in those countries. Last year India could not export much because she entered foreign markets a bit late, and importing countries had previous commitments.

The Government's idea was to allow "free exports" of rice so that merchants could get offers from foreign countries. They could, under a barter basis, bring goods required for the country. If free exports were allowed, merchants would be able to export more rice and at the same time, obtain an economical price for their produce.

CULTIVATION OF ORANGE IN ASSAM

THE orange of commerce is mostly grown in the Khasi and the Jaintia hills of Assam. Its cultivation is rapidly increasing in the hillocks and plains of both the Surma and the Assam valleys and is extending rapidly to the neighbouring hills of Garo, Jaintia, Cachar and Lushai. The most important orange growing section in the Khasi hills lies in the middle of the southern slopes of the district, especially by the banks of the hill streams where the fertility of the soil is replenished by the silt left by the annual floods. The natural precipitation being very high and the soil being mostly calcareous these tracts are marvellously suited to the cultivation of orange.

SOIL CONDITIONS

Orange trees are found to be grown in the state under a wide range of soil conditions. Although a number of successful gardens exists both in the hills and the plains, there is always a danger of failure owing to a bad choice in selecting the location and soil. Even the tracts in the Khasi and the Jaintia hills where orange are grown commercially are not at all favourable for the cultivation of oranges and there are many localities where the conditions either in soil or climate are destructive to the enterprise. Instances are not rare both in the hills and the plains where owing to selection of soil and site the gardens become altogether a failure. Consequently in selecting a site for garden one should consider the depth of the soil which should preferably be of well-drained deep loam but when a shallow soil is chosen artificial means should be adopted to cultivate deep, manure and water regularly so that trees can maintain their growth easily. It is [illegible] for the lack of such [illegible] trees both in the hills and the [illegible] yellow and die prematurely.

"Growing oranges in a [illegible] can hardly become profitable. Soils [illegible] are of heavy clay type, through [illegible] water cannot percolate easily [illegible] suitable for orange cultivation. [illegible] such a soil if artificial means of [illegible] is adopted like the tea gardens, [illegible] well. Planting the trees on a clay [illegible] under heavy rain conditions of [illegible] always dangerous. On the other [illegible] very porous soil with a gravell or [illegible] sub-soil which can hardly hold [illegible] should be avoided. Under such unfavour[illegible] able conditions trees may grow for [illegible] but they are liable to suffer when [illegible] come to bearing stage. The best [illegible] condition is found only in places where the top soil is loose, friable, having a good tilth and the subsoil is loamy which retains the moisture partly but does [illegible] bring a stagnant condition.

TYPES OF ORANGES

The oranges of Khasi hills and [illegible] in general belong to the loose [illegible] group of Mandarin oranges which [illegible] known as U. Soh-niamtra in Khasi [illegible] Jaintia hills. They may be divided [illegible] types viz. thick-skinned and thin-skinned. The former is very juicy, sweet, [illegible] in appearance and heavier [illegible] than the latter which is rather puffy [illegible] raggy. But the latter, though inferior in quality, stands transportation better and consequently the latter type is more [illegible] by the dealers who transact the business in marketing oranges.

There is a particular variety [illegible] oranges in Khasi hills which have a very thick skin and are very sour. They [illegible] known as U-soh Nienggiang. They resemble the Sevelle oranges of [illegible]

...ness. There is another variety with ... and skin which is called U-Sho-si n in Khasi and Korum in Bengal. A few Santra orange trees have been introduced by some growers but the fruits are found to some growers but the fruits are found to be inferior in quality than the local varieties.

METHODS OF CULTIVATION

The methods of cultivation of oranges followed by the people both in the hills and plains are realy crude. The major are in generally speaking covered with portion of the area where orange gardens are in generally speaking covered with jungles which have to be cleared before any attempt is made for planting. In clearing a land in root hills or plains one should always see whether any money can be earned by selling the wood as fuel or making charcoal. At the very outset of the growers plant plantain suckers after the bushes are burnt down and plant the trees in between the same.

In the hills the rocky nature of soil makes any kind of cultivation almost impossible and if the soil is hoed in a slope there is always the danger of washing away of the soil by heavy precipitation. In such a case it would have paid in the long run, if terraces could be made and the land could be cleared of stones which could be put at the edges to check the soil wash. As terracing is rather expensive it would have also served the purpose if a semi-circular bed could be made with a hoe at the place where an orange tree is to be planted and the stones could have been piled upon the outer edge to check the soil wash.

The gardens in the plains are naturally free from stones unlike the hills but there the soil is liable to be water logged in the rainy season. For this reason draining is ... essentially required as found in the ... There are many places both in the valleys and in the hill sides where owing to the nature of the subsoil the water during the rainy months, is held in the soil until they are evaporated in the dry season. Such a water logging results in a boggy condition which injures the roots of the trees.

AGRICULTURAL OPERATIONS FOR MARCH

For The Plains.

Vegetables:—About the middle of this month remove the soil from the roots of Asparagus and covers them over again immediately with fresh soil, well enriched with old manure, and commence watering copiously.

Take up Carrots and Beet and store them in pots of dry earth for future use.

Take up and store onions.

At the beginning of this month, in the upper Provinces, seeds of American Squash should be sown.

The stumps of Cabbages that have been cut should be allowed to remain and be watered, as by their sprouts they will afford nice gatherings for the table for some time to come.

Dry the leaves of English Sage and Thyme, and store in bottles.

Make souring of Parsley in a shady place.

Fruits:—Lichees will be ripening; cover the trees betimes with the nets, to save the fruit from birds.

Well water Peach, Plum and Mango trees. Fertilise Vanilla Flowers.

Cut back closely all wood of last years growth of Bael trees.

This is the season, both in Bengal and Upper India for sowing the seeds of fine kinds of Melons.

Thin out Plantains remove the soil from the roots, fill in with fresh cow manure, and water liberally.

ORNAMENTAL PLANTS:—Withhold water from Dahlias and when the stems have died down, take up the tubers and store them in pots of earth or sand in dry godown.

Treat in the same way the several species of Oxalis.

Withhold water from Gloxinia maculate, Lilium longifolium and Richardia Ethopica, and when the stems and leaves have died down, remove the pots, with the bulbs within them undisturbed, to some dry godown till the time of repotting in the following October. Other bulbous and tuberous-rooted plants of a similar description should, of course, receive similar treatment.

Cut well back the wood of last season's growth of shrubs, such as Poinsettia, Holmskioldia, Hamiltonia, Phlogacanthus, Aphelandra, Buddlea, Thunbergia and Cassia alata, that have lately finished flowering.

Euphorbia Jacquiniflora should be treated in a similar way, and the cuttings inserted in pots of sand kept in a sheltered place and well watered; they will afford a nice stock of new plants.

Take up the choicer kinds of Verbena to pot, and keep under shelter during the rains.

For The Hills.

VEGETABLES:—This is a very busy month for the gardener on the hills. The vegetables sown last month should be put out in the open about the middle of this month. Make successive sowings of the same and first sowing of Peas, Beans, Tomato, Salsify, Mustard, Onion, Cucumber and knol-khol either in prepared sheltered beds or in pots, pans and boxes.

FRUITS:—Fruit trees should now be pruned and manured. The treatment for each will be found in its proper place. It may be mentioned in a general way that whatever treatment fruit trees receive now will show itself in the fruit hereafter.

FLOWERS:—About this time the stove and greenhouse should be thoroughly overhauled. Cuttings of Geraniums, Fuchsias, Roses, Hydrangeas, Begonias, etc., should be put down, and a good stock of plants will be the result. Bulbs of Hyacynths, Narcissus, Gladiolus, Tulips, Ranunculus, Anemones, Spiraeas, Ixias, Sparaxis and the different varieties of Lilium should be put down in pots, or in well-prepared borders.

An occasional application of liquid manure now will have a wonderful effect on Roses. Geraniums and Fuchsias will also be greatly benefitted by an occasional supply.

Seedlings of annuals will be requiring their second shift about the end of this month. Cenerarias, Calceolarias and Heartsease will be sufficiently developed to be moved into their permanent quarters. They should have plenty of light (Sun Light) and air. The best place for them is under a cloth awning. They should be liberally watered, and once a week, with a weak solution of liquid manure. These annuals make a grand show if well cared for now.

Ferus should be carefully examined, and those requiring it, should be repotted. Many of the soft-wooded plants, under glass will also require re-potting at this season.

Perennial Phlox, Carnations, Picotees and Hydrangeas should now be looked to. Give them fresh soil, remove all old and dead branches, and put down cuttings.

The nights and mornings are yet cold, and care should be taken not to allow the temperature in the stove and green house to go down too low.

Abrasive Paper and Cloth

THE term abrasive paper and cloth is a general one used to designate any abrasive material coated on a flexible or semiflexible backing. Such materials also are called coated abrasives. Enormous quantities of these products are used in the wood working metal finishing and other industries.

COATED ABRASIVES

Commonly used coated abrasives are flint paper and cloth, garnet paper and cloth, emery paper and cloth, aluminium oxide paper and cloth, silicon carbide paper and cloth, and crocus paper and cloth. Aside from the paper and cloth backings, a combination backing made of paper and a thin web of cloth also is used in making materials for belt sanding.

KINDS OF PAPER AND CLOTH REQUIRED

The paper backing of coated abrasives is substantial rope paper stock. Bleached and unbleached kraft paper pulps and rag stock are the common pulps used in the manufacture of abrasive papers. In some of the best grades, manila hemp may be used.

It is made of various kinds for specific purposes.. Cloth is light or heavy duck, jeans and drills. The so-called water-proof paper is used for rubbing paint. It is made water-proof so that it can be used with water or oil. Coated abrasives are made both close and open coated. The open form of coating is comparatively a new departure. Such papers are used for sanding paint or varnish or for any purpose where ordinary close-coated paper shows a tendency to fill up readily.

ADHESIVE USED

In making abrasive paper and cloth the adhesive mainly used is made from animal glue or a synthetic resin. Synthetic resins such as the alkyds and phenolic resins are used as the adhesive when the paper is to be used for wet sanding, whereas animal glue is used for regular and dry sanding. Hide glue used because of its higher strength compared to the bone glue.

QUALITIES OF ADHESIVE PAPER

The adhesive papers are made of various types. Different degrees of coarseness are used but each is made as uniform as possible. The efficacy of the paper depends on the sharpness and hardness of the coating material, the dimensions of the particles having also an influence on the result. Thus, larger the coarser particles will cut more deeply into the surface under treatment, and therefore, these coarse grades of paper are more suitable for smoothing down considerable inequalities at a quick rate. On the other hand finer papers, though of equally sharp material, make smaller scratches and therefore these papers are best adapted for finishing the smoothing process. For these reasons, various grades of fineness are made, the material varying from a

[illegible] barely be detected by touch (the diameter of particles being 0.005 m.m.) to granules measuring 0.1 m.m. and discernible by unassisted eye. Between these extremes, granules measuring 0.02 m.m. and of globular polyhedral form, can be detected by the finger of the experienced observer. In addition to the size of granules, however, their form and character influence the feel, sharp edged particles feeling coarser than rounded granules of equal or even larger dimensions; and all these considerations are matters of importance to the maker of cleaning and polishing papers and cloths. The finished article is graded in different degrees of fineness, marked by numbers, the finest being No. 000 and the next in succession 00, 0, 1, 2, 3, 4, 5, 6 and 7: the last named being very coarse and capable of making deep scratches when used.

GENERAL COATING PROCESS

In the coating process a layer of adhesive is first applied to the paper, and then grains of abrasive are dropped as evenly as possible on the wet adhesive film. Then an anchoring coat of adhesive is applied over the abrasive to hold the individual grains more firmly. It is necessary that the abrasive particles be well wetted by the binder to obtain the maximum bonding effect.

In recent years, a new method of distributing the abrasive has been developed which uses an electric field of about 40,000 to50,00 volts between the drive belt carrying the grains of abrasive and the glue-coated paper held about ½ inch away. As the grains enter the electric field, they are picked [illegible] electric field lines up the [illegible] abrasive in the direction of their long axis, and since they all have the same charge, they are kept in uniform distribution over the surface of the paper.

Another modern process is briefly described here. In this process the sheet of paper or cloth travelling at a uniform speed first passes through a rotary printing press that imprints the grit number, trade mark, etc., at regular intervals. Then the web of paper is spread thoroughly with a high grade of glue. The paper with the glue coating next passes under a hopper from which a regulated flow of abrasive falls. Next in its journey the material is given a sizing coat of glue. Then by mechanical means it is hung up in festoons to dry in the same manner that wall-paper is dried. Then it is wound in large rolls and set away to age as the so-called green paper is not an efficient product. After curing thoroughly, which should consume several weeks, the paper is cut into the desired widths and wound in rolls or cut into sheets for ream goods. The machinery used by abrasive paper and cloth makers all is of a special nature, each company designing and building its own equipment.

Having described briefly the character and principle of making abrasive paper and cloth, let us now go into more detail of making a particular paper so that the manufacturer will not find any difficulty of making these articles.

GLASS PAPER

This is largely used in smoothing wood, and the finely powdered glass employed acts like an extremely fine

tle, besides being able to polish any substance softer than itself. Hence, in the absence of emery paper, glass paper can be used in rubbing metal, though it does not bite into the metal so well as emery and the edges of the fine particles of glass soon. Wear down, so that the paper loses its sharpness in a brief space of time. Of coarse, glass paper is the best material for rubbing down such substances as wood ivory, bone, tortoise shell, mother-of-pearl, paints and varnishes, etc., since it can be used dry, and being colourless does not make the articles dirty under treatment.

Glass paper is made in different degrees of fineness, according to the purpose for which it is required, the size of the particles ranging from the fineness of flour to ½ m.m. in diameter. The manufacturing process was long conducted in a very primitive manner and even now there are only a few makers who have adopted improved methods, although the industry is a fairly important one.

One of the chief foctors in the process is the grading of the powdered glass into the several degrees of fineness required. In small works the usual plan is to pound the glass with heavy iron pestle in an iron mortar. All kinds of waste glass (Cullet) are used, the only essential point being that the material must be clean, free from fat, oil, dried paint, varnish, chemicals, etc., so that the glass waste should be carefully sorted.

CLEANING THE GLASS

The dirty portions may be carefully pounded and then boiled in strong caustic lye till all the adhering substances have been loosened, this being followed by repeated washing in changes of clean water until the later is no longer alkaline. Dirty glass may also be purified by burning of the organic impurities and then throwing the hot glass into cold water, the rapid cooling causing the glass to break into small fragments whilst the carbonised organic matter floats on the surface of the water and can be easily removed.

PULVERISING THE GLASS

For pulverising the glass mill stones may be used, but stamps driven by power preferable where operations are conducted on a big scale.

A stamps mill generally consists of a fixed chests, with cast iron sides forming the support for the mechanism. The bottom is also of cast iron. Inside the chest, which is closed in by means of wooden doors, to prevent inconveninence to the workmen from disseminated glass dust, are two iron cylinders turned true inside, and revolving intermittently after each stroke of the stamps. The glass is pounded by the impact of these stamps, which also rotate on their own axes.

All degrees of fineness in the powdered glass can be obtained with this machine. The iron cylinders are charged with broken glass, and on closing the doors the stamps can be set going. Where it is considered that the powder has been crushed sufficiently fine, the machine is stopped, the contents are removed and the cylinders are re-charged, these operations being repeated until enough powder has been accumulated for the next process, that is sifting. When the glass is crushed in

[illegible] number of screens of different mesh corresponding to the various grades required; but this is a trouble-some operations and is injurious to the men engaged unless they properly closed their mouth and nose. If, however, the work is a sufficiently large scale, the manufacturer may use sifting machine which consists of a closed wooden chest, containing a cylindrical wooden frame covered with wire gauge and set on rotation by a set of pulley. Another pulley at the opposite end of the same shaft controls the automatic feed of materials to be screened. Inside the screening cylinder is a fan which sets up a current of air and facilitates the sifting process. The glass powder is placed on the hopper and fed thence by an automatic device into the cylinder. The fine particles traverse the screen and face to the bottom of the chest whilst the coarser portions remain in the cylinder. To enable the screenings to be graded in the one machine, a number of interchangeable cylinders, with different mesh are provided. The coarser screen is put in first, and all the particles left behind in this one are used for the coarser glass paper. The second screen being then put in, gives a finer grain, and so on until the whole supply has been graded, the product from each screen being stored in its proper bin.

PAPER TO BE USED

The paper to be used in making glass paper should be strong of long staple containing as little wood pulp as possible or it will easily tear and break in use. It should be fairly thick to prevent the glue soaking through but not so heavy as to increase its price unnecessarily. Freedom from lumps found present being removed [illegible] aid of pumice, in order to [illegible] surface. Otherwise they would [illegible] through the glue and coating of [illegible] or form little hillocks of [illegible] spoil the surface of the product, [illegible] unfitting it for producing a level [illegible] on the substances on which it is [illegible]

METHOD OF GLUING

The paper cut into sheets of [illegible] size is laid on a large work [illegible] fastened down with plus or Clips [illegible] four corners, and then coated [illegible] with hot glue laid on with a wide [illegible] stringy and difficult to spread. [illegible] glue also must be of good quality [illegible] of suitable consistency if the [illegible] results are to be obtained. If the [illegible] is too thin and the paper poor, it will soak in and there will be not enough [illegible] on the surface to stick the powdered glass properly so that the latter will [illegible] liable to peel off in places and leave the surface more or less bare. This [illegible] especially the case with the [illegible] grades of glass paper, the glue requir-ing to be applied with great care so as to hold the particles of glass, these being from their nature, incapable of absorb-ing any of the glue, and tending, on account of their smooth surface to spring off. On the other hand, glue that is too thick dries quickly on the surface whilst the under part is still damp, so that the glass powder cannot become imbedded in the coat. Uneven distribu-tion of the glue gives alternate thick and thin streaks, which show up very prominently when the glass is dusted on, and spoil the paper for use.

[illegible] GLASS PAPER

As soon as the glue has been applied the powdered glass is dusted over the surface by means of a small hand sieve; an operation requiring a certain amount of care though not so much so as the preceding one. The best plan is to employ three men for the job one to apply the glue, the second to sprinkle the glass and third to remove the superfluous glass. It is not praticable to work the sieve so as to apply only just the necessary quantity of glass to the sheet but the sprinkling must be continued until the paper seems to be covered evenly all over. In this way some of the particles will not be sticking to the glass at all, but simply lying on the top of others; and these are not got rid of by turning the sheet over. This is done by a wooden roller running lightly over the sheet. This will press the glass into the glue and make the surface smooth, whereupon the paper can be hung up or laid on a rack to dry. The maker's name and other mark together with the number denoting the fineness of the paper, must be stencilled or painted on the back of the paper beforehand.

SAND PAPER

Sand paper is an old term that today is applied generally to paper or cloth coated with abrasive. This paper is put to the same uses as glass paper, but being of much harder material [illegible] the articles under treatment more energetically, and therefore needs [illegible] with greater care. At the same time it does not wear out so quickly as glass paper, the particles retaining the [illegible] of their point and edges [illegible] than glass.

The sand or powdered flint is [illegible] by sifting and is then applied to paper coated with glue. The paper should be of long staple, free from wood pulp, short fibres, and irregularities, the latter being removed, if present, by scraping. When cut into sheets of suitable size the paper pinned down on a table, and coated with glue of the proper consistency. The glue unless too thin soon dries and therefore the sand must be sprinkled over it without delay. The superfluous sand is removed by turning the paper over the sheet, is then rolled to fix the powder in position, and finally hung up to dry.

PUMICE PAPER OR CLOTH

This is made in the same way as glass or sand paper by coating strong paper or canvas with glue and sprinkling it with pumice powder of various degrees of fineness. This paper is suitable for polishing rusty iron and steel to which it will impart a perfectly bright surface.

EMERY CLOTH OR PAPER

This is also made in the same way as glass paper but with improved machineries. The glue required in this case should be fresh otherwise the emery particles do not fix on the paper or cloth tenaciously but will fall off easily. We briefly describe here the process of the preparation of glue before actually proceeding with the process of making the cloth.

PREPARATION OF GLUE

The glue suitable for coating the paper should be made from hide scrapes cut into fine shreds. Of this material 350 parts are mixed with 15 parts of alum, and 950 parts of water plus 15

[illegible] in a pan for about 7 hours, after which the mass is put through a sieve and pressed. The glue on cooling is treated with 24 parts of sulphurous acid, and at the end of 12 hours has attained the proper consistency for use.

PROCESS OF MANUFACTURE

In making emery paper or cloth, the paper or cloth to be coated is worked on a rollers, one of which is adjustably mounted so as to exert a controllable pressure on a felt covered roller that dips into the glue duct. The distribution of this glue on the paper is effected by a roller, actuated by friction from one of the rollers aforesaid. The paper or [illegible] hoppers, which discharge [illegible] powder over revolving [illegible] Ribbed rollers behind the hoppers [illegible] the paper or cloth to vibrate [illegible] facilitate the distribution of the [illegible] emery, the hoppers being in [illegible] for the same purpose. The [illegible] paper is next passed over a [illegible] whereby the loose powder is [illegible] and falls into a box, whilst the [illegible] passes onward over two steam [illegible] cylinders, by which it is partially [illegible] and then between two chilled [illegible] rollers, which smoothen it and [illegible] pressed the still viscid adhesive. A[illegible] drying the paper is cut into lengths [illegible] required sizes.

Manufacture of Paints

PAINT consists essentially of two factors, the pigment and the vehicle. The object of paint is two fold—it is used partly on account of its decorative effect and partly in virtue of its power of protecting the surface to which it is applied from decay.

The relative importance of these two functions varies with circumstances; sometimes the decorative, sometimes the protective function is the more important and these considerations will largely influence the composition and method of preparation. Although it is not strictly true in all cases, it may be considered broadly that the decorative value of a paint depends on the pigment used, whilst the preservative value is mainly a function of the vehicle.

Considered in its broadest sense, the term paint embraces all materials of this nature, whatever may be the manner in which the pigment is fixed to the surface, and may be subdivided according to the nature of the vehicle used. The various methods of painting may be classified thus:—

Oil paint, distemper, water colour, washable water paint, fresco.

Of these, the first is by far the most important in modern practice and by common consent the term paint is taken to signify oil paint unless mention is made to the contrary.

Whilst an oil paint of the very best quality will consist entirely of a single pure pigment and a drying oil, the paints employed for industrial purposes are more complicated in composition, and may contain:—

1. Pigment—(a) Body colours.
(b) A opaque white, to reduce the strength of colour and increase the opacity.
(c) White basis such as barytes to modify the character and reduce the cost.

2. Vehicle—(a) Drying oil.
(b) Drier.
(c) Volatile solvent, to adjust the working quality.

The proper composition of paint is at present a very contentious point. As regards the pigment, except in the case of pale tints, the paint should contain only a single pigment. But it is generally conceded that a paint may be composed of several pigments, especially in the case of white paints a mixture of white lead and zinc oxide, or titanium white and dinc oxide produces a better paint than any one of these pigments. The addition of barytes into the paint composition is regarded as an inert extended matter which is playing a legitimate part in the paint composition. Even if such pigments serve no actively useful function in the paint their presence is only detrimental in so far as they reduce the opacity. Where great opacity is required, their presence is objectionable, but for many purposes where this is not essential they merely have the effect of diluting the pigment and so reducing the cost considerably.

As regards the vehicle, again there is considerable divergence of opinion as to its precise composition, and much depends

[illegible] The following points may be mentioned as a rough indication of generally accepted principles :—

(1) The vehicle should be free from non-drying oils, which can only be regarded as adulterants, and which seriously impair the strength of the film.

(2) Excessive addition of drier should be rigorously avoided—other things being equal, a slow drying paint is more durable than a quick drying one, for the reason that the oxidation of the oil does not stop when the film has hardened but continues until eventually the film loses its elasticity, and becomes hard and brittle. Excess of drier, therefore, is hastening the initial stages, hastens also the final disintegration, and results in the paint soon cracking.

(3) The addition of thinner should be restricted to the minimum amount necessary to secure proper working consistency. Excess results in undue thinness of the film and lack of continuity, which impairs the life of the paint.

Having considered the above points we pass on to the actual process of manufacture. Theoretically, the manufacture of paint is quite a simple matter, merely consisting in the thorough incorporation of the various ingredients, but a great deal of skill has been devoted in recent years to the designing of machinery to accomplish the operation with rapidity, efficiency, and economy.

The manufacture is generally divided into two stages, the preparation of the paste paint by mixing and grinding, and the subsequent conversion of this into finished paint by thinning and refining.

MIXING

This was originally conducted in an apparatus known as a [illegible] general construction of which [illegible] of a cylinder fitted with a vertical [illegible] carrying arms. Such a simple apparatus in which the stirrers continually revolv[illegible] in one plane, is not very efficient, [illegible] during the past few years great attention has been paid by makers of such plant [illegible] the improvement of the design, with the object of securing more efficient mixing and less power consumption, combined with facilities for easy and rapid cleaning.

GRINDING

This was formerly accomplished by rubbing down the mixed paint with a large muller of glass or granite on a slab of simiar material. This is obviously a slow and tedious process, and except where expensive pigment are employed in small quantity, its cost is prohibitive to modern ideas. Grinding machinery has developed enormously in recent years in design and efficiency. A few of such machines are mentioned hereunder.

FLAT STONE MILLS

These mills grind very thoroughly the pigments but these are somewhat slow in operation and difficult to clean.

CONE MILLS

This may be regarded as a modification of the flat stone mill, in which the surface of contact is conical instead o[illegible] lower one revolved against it, the pressure being obtained by set screws and springs instead of by dead weight.

ROLLER GRINDING MILLS

These mills are of comparatively modern introduction, but they are now [illegible]

almost universal use for grinding paint and similar products.

Roller mills are most efficient for the grinding of materials of the consistency of a stiff paste,, and are eminently for the large scale production of paste paints, on account of their rapidity of working and the ease with which they can be cleaned.

The paint composition i.e. the pigments and vehicles after mixing and grinding into a stiff paste is next thinned down. The operation is known as thinning which we now deal with.

THINNING

For the conversion of the paste to the liquid or ready mixed condition it is only necessary to agitate the paste with the thinning vehicle. A variety of machines fitted with agitators of various types have been used for this purpose. A vertical mixer is quite efficient for this operation and is largely used.

FINISHING

However carefully the paints may be prepared industrial pigments are liable to contain particles of extraneous matters such as woody fibres. which are difficult to reduce by grinding. For high class ready mixed paints, where a smooth finish is required, it is necessary to ensure the removal of these by a finishing operation. This may be done by straining. The old-fashioned method of straining is the passing of the paint through a piece of muslin. This method is rather crude and wasteful. It is still operated in small factories with some modification. That is, the operation is carried out by passing the paint through wire gauge. But the difficulty with all such methods is the removal of the accumulated impurities and the cleaning of the gauge.

The most efficient refining is undoubtedly obtained by centrifugal action and the modern tendency is to adopt this method. Here the coarse particles are eliminated by centrifugal force and at the same time the paint or enamel is rendered more homogenous by the emulsifying action of the centrifuge.

BOILING LINSEED OIL

In the manufacture of paint the vehicle employed for the purpose is boiled linseed oil. The reason is that it possesses a good drying property due to its high content of glycerides of unsaturated acids.

Linseed oil when spread in thin films absorbs oxygen from the air and is evaporated into linoxyn a tough elastic body which is very insoluble and not readily acted on by chemical agents. This property of absorbing oxygen is greatly increased by heating the oil to about 300°F or higher in presence of certain oxides of metal, such as the oxides of lead, manganese and cobalt. This heated linseed oil with the driers is known as boiled oil.

The oil according to the old fashioned method was heated by direct fire heat in iron or copper pans to about 300°-400°F. and the driers, consisting of litharge, red lead, and manganese dioxide stirred in till completely taken up.

By this means a heavy-bodied dark oil was produced. which dries in about 8 hours with a tough hard film.

Fire-boiled is still preferred in some trades, such as for example, in the manufacture of waterproof sheetings.

In a modern boiling plant the usual process consists in heating from 5 to 10

[illegible] in large iron pans, provided with stirrers and blowers, and heated with superheated steam.

The oil is pumped into the pan of metal it is three quartersfull, and is heated with steam, whereby the temperature of the oil is gradually raised. At about 222°F a considerable amount of frothing takes place, due to the evolution of moisture in the form of steam. At about 300°F the requisite amount of driers added.

The driers in general use are mixtures of lead and manganese resinates but the resinates of cobalt are also used.

The oil is now blown, and the temperature is maintained at about 300°F for 8 hours. Samples are drawn off from time to time, when the required colour is obtained, then the stirrers are stopped and the steam and blowers shut off and the whole left for 12 hours to settle out.

During the process of boiling the oil undergoes some decomposition, water is continually being given off, accompanied by a large quantity of acrolin.

The quantity of driers used depends on the kind of oil that is required—that is whether pale or dark. Care should be taken not to use excessive quantities of driers as these would accelerate the rate of drying to such an extent that the films produced from such oils would be crinkly and spotty.

STEAM DOUBLE BOILED LINSEED OIL

Raw linseed oil	1	ton.
Resinate Drier	63	lbs.

Melt drier with 5 gallon of oil and add when the temperature is about 200°F.

[illegible]

The process of manufacture is similar except that the temperature should be raised to 300°F.

Raw linseed oil	I	II
Litharge	10 lbs.	6 lbs.
Red lead	15 „	9 „
Sulphate of Manganese	3 „	— „
Manganese dioxide	—	2¼ lbs.

SOME TYPICAL FORMULAS

The following formulas are recommended for the manufacture of ready mixed paints:—

WHITE

I

White lead	5	cwt.
Barytes	70	lbs.
China clay	70	„
Ultramarine blue	1¼	oz.
Boiled linseed oil	6	gallons.

II

White lead	1	cwt.
Zinc sulphate	½	cwt.
Barytes	6	„
Ultramarine blue	1½	oz.
Refined linseed oil	7	gallons.

III

Zinc oxide	4	cwt.
Barytes	6	„
Refined linseed oil	1	„

IV

Barytes	4½	cwt.
V.M.I. Zinc oxide	2	„
Ultramarine blue	1	oz.
Boiled linseed oil	7½	gallons.

RED

Red oxide of iron	3	cwt.
Barytes	1	,,
Whiting (dried)	1	,,
China clay	½	,,
Raw linseed oil	14	gallons.

BRIGHT RED

Vermilion	2	cwt.
Barytes	½	
Raw linseed oil	3	gallons.

PURPLE

Purple oxide of iron	1	cwt.
Barytes	2	,,
Whiting	1½	,,
Terra alba	2½	,,
Pine oil	3½	gallons.
Raw linseed oil	3½	,,

BROWN

Vanadyke brown	2	cwt.
Whiting	½	,,
Terra alba	½	,,
Raw linseed oil	24	gallons.

YELLOW

Yellow ochre	168	lbs.
Lemon chrome	14	,,
Barytes	14	,,
Whiting	7	,,
Raw linseed oil	12	,,
Pale boiled oil	12	,,

LEMON CHROME

Lemon chrome	2	cwt.
Barytes	½	,,
China clay	½	cwt.
Raw linseed oil	6	gallons.

BLACK

I

Lampblack	28	lbs.
Carbon black	7	,,
Prussian blue	6	,,
Terra alba	28	,,
Boiled linseed oil	35	,,

II

Carbon black	2	lbs.
Barytes	1	cwt.
Dried whiting	7	lbs.
Boiled linseed oil	12	,,

GREEN

Light green	2	cwt.
Barytes	1	,,
Raw linseed oil	4	gallons.

BLUE

Prussian blue	1	cwt.
Barytes	28	lbs.
Raw linseed oil	4½	gallons.

With the above formulas only ready mixed paints may be obtained by mixing, grinding and rolling. When these paste paints are mixed with sufficient qutntity of boiled and double boiled linseed oil and thin down with a small quantity of turpentine oil or other solvents to adjust the working quality, fine liquid paint may be produced. Of course these liquid paints should be strained in the manner already described to get good type of paint free from lumps.

The above is the process of making oil paints but other types of paints will be dealt with in a subsequent article.

Canning Veget

ONLY fresh properly matured vegetables should be canned. They should be free from decay and from injuries due to rough handling. The more perishable vegetables should be canned within a few hours after harvesting because they deteriorate rapidly. The less perishable ones such as beets, carrots, and winter squash may, if necessary, be held for some time. In fact winter squash and pumpkin will be greatly improved if allowed to ripen thoroughly in storage. Vegetables that are canned while immature, such as peas, string beans, sweet corn, and greens, should be used at that stage when they are just right for table use.

GRADING.—Many of the vegetables, if canned in sufficient quantity to warrant it, should be graded according to size and degree of maturity. Grading is imperative if products are to be sold. Asparagus, beets, carrots, peas, string beans, and tomatoes will give much more satisfactory packs if properly graded.

WASHING.—Most vegetables require thorough washing before preparation. Running water is preferable but if not available the vegetables should be washed through several changes of water. They should be lifted from the wash water rather than to pour the water off them. Beets and carrots may require thorough scrubbing.

BLANCHING.—Blanching is the operation in which the raw material is subjected to the action of steam or hot water for a specified time followed, as a rule, by thorough cooling in cold water. This partial cooking of the vegeta for some definite purpose and when is accomplished, further cooking is at once by the transfer of the mat cold water. Some of the objects of ing are still a question for inves but practical canners agree that vegetables should be blanched. reasons which are most commonly for blanching are as follows:

1. To reduce the bulk, as in

2. To remove objectionable flavo All green-coloured vegetables have peculiar flavour which is volatilized cooking takes place in an open This flavour remains in the when the vegetable is cooked in a or partially sealed container. Blanc will remove the excess of this obj able flavour.

3. To expel included gases: all tables have some air or other enclosed within them. Some large amounts of included gases. the vegetables are heated their become more porous, the included expand and the bulk of them are out. If the cooling process which heating is prolonged until the are quite cold, water is absorbed the space previously occupied by the in the unblanched vegetable. Many vegetables float on water, but when blanched and properly cooled they sink in water.

4. To facilitate handling and ing. Such vegetables as carrots, string beans, and others

character not only handle more ...y if properly blanched, but ... material may be packed into the ...s. Sweet corn that has been ...d is less "mussy" and packs much ... than unblanched corn.

5. As an aid to preservation. Blanching destroys many of the active bacteria and washes away large numbers of spores in contact with most vegetables. The hot water or steam quickly softens the vegetable tissue and thereby permits more rapid penetration of heat during the early stages of processing.

6. For effect on colour. The proper amount of heating followed by cooling in a weak brine may favourably effect the colour of some green vegetables such as asparagus and green string beans. Blanching gives a finished appearance to some vegetables, notably carrots. As a rule there is less sediment in jars of properly blanched vegetables.

7. To remove skins. The most economical and practical method of removing the peel or skin from such vegetables as beets, carrots, and tomatoes is by blanching. The exposure to the heat of the water or steam cooks the vegetable ... enough to loosen the skin and the sudden cooling in cold water stops any further cooking which would make the vegetable soft.

The Blanching Period.—Unless otherwise specified the blanching water ... be boiling before the vegetables ... placed in it and the volume of the ... should be, at least, four to six times ... of the material to be blanched. The ... begins when the materials are ... in the boiling water and proceeds ... the length of time specified or until desired results are obtained. Obviously the relative amounts of water and material will have a profound effect upon the results accomplished in any given period. If the blanching periods given do not produce the desired results the necessary adjustments can be made. Results, not the blind following of a recipe, are what is desired.

Filling the Containers.—As a general rule the interval between blanching and packing should be brief. Blanched vegetables should be left in the cold water only long enough to become thoroughly chilled. They should be packed and processed with as little delay as possible.

Insufficient blanching may be the cause of slack packing of jars or it may cause a lack of free liquor in the jars. Overblanching will result in soft, pulpy materials.

Packing.—In order to reduce spoilage to a minimum and at the same time to secure attractive packages the containers should be packed uniformly. The home canner and small factory operator are urged to pack by weight until they have become sufficiently expert to rely upon their experience as a guide. It is most unfortunate that the glass jars now available vary so much in their respective capacities that no standard weights can be given. The following general rule may serve as a guide in establishing a standard pack for the different vegetables. As a general rule the minimum amount of material which will give a well-filled, moderately tight and attractive looking jar after processing is the most satisfactory pack.

CLASSES OF VEGETABLES

The experienced vegetable canner groups the common vegetables into four general classes: 1. Those that swell during processing, as peas, shell beans and succotash. 2. Those that tend to pack too tightly, as sweet corn, baked beans, and all greens. 3. Those that pack loosely or that leave large spaces in the container, as beets, carrots, corn on the cob, string beans, etc. 4. Those that are fairly liquid and that neither shrink nor swell as a result of processing, such as tomatoes, soup stocks, etc.

The careful canner will take the above facts into careful consideration and will pack accordingly. Vegetables in Class I will be packed lightly, allowing sufficient space for the increased volume which comes as a result of processing. A part of this increase in volume is due to absorption of lijuid in the jar. This results in the jars having a rather low liquor content. This may be counteracted to some extent by leaving the vegetables in the cooling water an additional five or ten minutes and by filling the packed jars full of liquid instead of filling only to within onelhalf inch of the top.

Vegetables in Class 2 are the most difficult to pack unless a standard weight per jar has been worked out. Those like sweet corn and baked beans should be shaken lightly into the jar, filling the jar to within $\frac{1}{2}$ inch of the top: and brine (in case of corn) or pot liquor (with baked beans) should be added filling container full. Greens when properly blanched may be packed into the jars until the liquid fills the jar and the solids are within $\frac{1}{2}$ inch of the top. Over-packing of these vegetables is sure to result in spoiled packages.

Vegetables in Class 3 are packed as tightly as possible without injury to the material, and the jars [illegible] liquid—water or brine.

Tomatoes and squash [illegible] thoroughly cooked are packed [illegible] jars filling them practically full.

NOTE.—In packing tin cans [illegible] space of $\frac{1}{8}$ to $\frac{1}{4}$ inch must be [illegible] cases.

SALT OR BRINE.—In canning [illegible] tables in the home it is the general [illegible] to add salt to the packed material [illegible] additional liquid is necessary the [illegible] filled with hot water. When [illegible] quantities are canned it is easier to [illegible] the salt in the form of brine except [illegible] those cases such as tomatoes and greens where no additional liquor is necessary. Brine for this purpose is made by dissolving four to six tablespoons of salt [illegible] a gallon of water.

Salt or brine is added to vegetables because it improves their flavour and because the solvent power of pure water destroys the firmness and colour of many vegetables. Salt has a tendency to toughen the fibres and to fix set the colour. Water which contains any appreciable amount of iron or lime should not be used in canning. Iron will darken the colour of the liquor of some vegetables and lime tends to toughen and harden many vegetables.

The canner should avoid the use of table salt which contains starch. The starch is insoluble and will give a cloudy appearance to the liquor or it may form a white deposit on the bottom of the jar.

PREPARATION OF CANNED VEGETABLES FOR THE TABLE

Dietitians are pretty well agreed that practically all non-acid vegetables should be given a few minutes' boiling in an open vessel before serving. Any package of vegetables that has a foreign odour [illegible]

[illegible] in taste, flavour, or appearance is not [illegible] should be discarded.

These precautions are recommended because they constitute the best possible insurance against any ill effects from eating spoiled canned vegetables. Comparatively little injury has resulted from the consumption of canned vegetables and most, if not all, of this could have been prevented had the proper precautions been observed. These suggestions should be applied to both home canned and factory canned vegetables. If canned vegetables are to be used in salads they may be heated sufficiently in advance to allow cooling before time of serving.

RECIPES FOR CANNING VEGETABLES

ASPARAGUS

Asparagus should be young and tender and since it deteriorates rapidly it should be canned as soon after harvesting as possible. It should be graded to size and condition and thoroughly washed in cold water. The stalks are then cut to a length suitable for packing vertically in the containers. This is most readily done by means of a cutting box having two [illegible] open and a depth that is the length of stalk desired. The graded stalks are laid in the box tips against the back and when a sufficient number to fill a container has been placed, the protruding butts are cut off with a sharp knife. The stalks are [illegible] tied into bundles or left loose, depending upon method of blanching. [illegible] purpose of blanching is to remove the [illegible] chlorophyll flavour, expel con[illegible] gases and to make the stalks [illegible] for ease in packing. Blanching [illegible] be done in either of two ways: (1) [illegible] tied bunches are set into the [illegible] bath tips up with the hot water [illegible] up about half-way to the tops. They are left in this position for 3 to 5 [illegible] then the bunches are laid on the side so that the tips become submerged and are left for 2 to 3 minutes longer. They are then removed and quickly cooled in cold water. This method has the advantage of giving a uniform blanching but does require more time and attention. (2) The loose stalks are placed in a wire basket or cheesecloth and blanched in steam (10 to 15 minutes) or in boiling water for 3 to 4 minutes, depending upon age of asparagus. The stalks are then quickly cooled in cold water. Although this latter method requires less attention than the one preceding it does not give as uniform blanching, but results are fairly satisfactory if the blanching period is not too long.

The stalks are packed into the container, tips up, except in the centre of the package two or three stalks should be packed tips down. This tends to even up the tightness of the pack and makes it easier to remove the perfect stalks from the container. Glass jars are partially sealed and processed in the hot water bath at 212°F., pints 100 minutes, quarts 120 minutes; or under 10 pounds steam pressure pints 35 minutes, quarts 40 minutes.

In cutting the asparagus into suitable lengths for canning as stalks or tips there is generally a part of the discarded butts that is tender and of good quality. This is canned as chunks or cut asparagus. The tender portion is cut into inch lengths, blanched in steam for 20 minutes or in boiling water for 5 minutes, cooled in water and shaken lightly into containers. A teaspoonful of salt is added to each pint jar and the jar is filled with hot water. The jars are partially sealed and processed as directed for canning stalks.

Asparagus from fields that have recently been limed or that have had sulphur dust applied for control of insects should not be used for canning.

Gums in Paints and Coating Compositions

WATER paints employing casein as a vehicle or binder are exceedingly old. Ancient Hebrew texts mention the painter and decorator who used soured milk, the important constituent of which is casein. Factorymade cas in paints in powder form have been sold in the United States since the latter part of the nineteenth century.

It is only in recent years after much development work that the hydrophilic colloids and modified cellulose began to find application in the paint industry. The hydrophilic colloids are alginic acid and its sodium and ammonium salts, and the modified celluloses are sodium carboxymethylcellulose, aluminium cellulose. They do not constitute a major ingredient in the formulation of the water paints, but nevertheless are of importance because of their stabilizing effects on emulsions of paints, waxes, and numerous other products.

They are utilized with no modifying agents added, their use in the paint field is limited to a few special items such as binders in fire-resistant paints where the water-resistant property is not an essential requirement.

The Official Digest states that the alginates and modified cellulose are best incorporated with an emulsion if, prior to this, they are dissolved and added as a solution. Since relatively small concentrations of the alginates and cellulose derivatives can be dissolved in water, their use in this manner is sometimes impossible permitting only a small amount of water in the neighbourhood of 5 per cent. In paints where the concentration [illegible] is low, the protective colloid is best incorporated by grinding it directly into the paint. If this method is employed, care must be taken to insure proper dispersion throughout the emulsion [illegible] cellulose derivatives are rather fibrous by nature and are not easily reduced in [illegible] in the grinding operation.

The solubility characteristics of the various celluloses must be taken into consideration in making up the solution or gel. Sodium carboxymethylcellulose, hydroxyethylcellulose, ammonium and sodium alginate are soluble in hot or cold water, but more readily so in hot water. Methyl cellulose is soluble in cold and not in hot water. Aluminium carboxymethylcellulose is soluble in an alkaline medium.

It is suggested that the dry powder be pre-wet with one of the solvents in the emulsion so as to aid the materials into solution. This pre-wetting prevents the formation of large agglomerates which are difficult to disperse.

Three viscosity grades of the cellulose derivatives and the alginates in three concentrations, 1, 5, and 10 per cent were compared. The solutions or gels were blended with several emulsions, the oil-in-water type in the ratio of one part of cellulose or alginate solution to four parts of emulsion (unpigmented). The oil-in-water emulsions used were alkyd resin emulsion, emulsifiable paint (Federal Specification T-1279 type, polyvinyl acetate emulsions, acrysol WA-5, and numerous others). These mixtures were then reduced 1 : 3 with water to note incompatibility. The emulsions were compatible with all the cellulose or alginate solutions taking the 1 : 3 reduction without throwing out. The

[illegible] could still be reduced in the same manner after standing one week, without breaking or separating. The ability of a stabilizer to aid in keeping the emulsion in its original phase is important, since oil-in-water emulsions often reverse to water-in-oil types upon long standing if they have not been properly formulated.

The addition of pigment often greatly affects the stability of emulsions, and influences the choice of a certain cellulose derivative, alginate, or other protective colloid, depends on the properties desired in the emulsion and also on the constituents in the emulsion itself.

The alginates have been incorporated in asphaltic paints and varnishes, shellac emulsions, and waterproofing compositions in an emulsified form.

Gum arabic has been employed in paints as a glaze or varnish and for emulsifying oils.

Dextrin has been utilised to some extent in painting, but it is rarely used for emulsifying purposes.

Bruhn and Timpke propose the utilization of seaweed jelly in paint formulations.

Clayton found that gelatin emulsifies oils of both glyceride and hydrocarbon nature. Substances such as gum acacia, gelatin, casein, dextrin, agar, soap, and albumins act as emulsifiers by virtue of their ability to form colloidal hydrated compounds.

The gums also find application in coating compositions. Gelatin seems to be the one most employed, while the other gums are of lesser importance.

Murphy and Simmons describe a coating composition comprising rubber and powders of good covering power prepared by making the powders with irreversible granular precipitates of rubber, etc., in any suitable paint mill. In the production of a white water distemper 150 parts of 60 per cent latex is added to 30 parts of sodium silicate dissolved in 30 parts of water. The granular precipitate obtained on dilution to a 5 per cent solution plus 24 parts of 5 per cent aluminium sulphate is stirred and allowed to stand over a filter cloth so as to obtain a creamy mass of 16 per cent concentration. A mix of zinc oxide 600 parts, china clay 500 parts, gum acacia 3.75 parts, aqueous ammonia (sp. gr. 0.880) 7.5 parts, water 985 parts, and the rubber precipitate 900 parts is made in a paint mill to uniform consistency.

Karaya gum was utilized by Manley and Wenzelberger in developing a flexible coated fabric. An adhesive fabric consists of a backing fabric and a barrier sheet composed of the solids of a latex-rubber dispersion, e.g., 60 per cent latex 334 to 200 parts, karaya gum 160 parts, and clay 100 parts, deposited on and vulcanized to the backing sheet, and an adhesive coated on the barrier sheet.

Erdhal describes a sizing and coating material composed of a colloidal solution of an algin base. The algin base is introduced into an acid bath such as 9 to 17 per cent sulphuric acid solution. The resultant precipitate is aged in the bath and the algin reaction product is collected.

A protective coating developed by Galakhov consists of a water glass of 55 to 60°Be. mixed with an adhesive such as dextrin, tripoli, finely powdered pigment,

and a previously prepared mixture of mineral oil with lime powder or a similar base.

A coating composition comprises an aqueous solution of a binder consisting of a protein glue or a water-soluble gum, and a flexibilizing agent such as sorbitol. The ratio of binder to the flexibilizing agent is not greater than 9 to 1 and not less than 1 to 3. The binder may be gelatin or proteins, dextrin, acacia, tragacanth, or karaya. The agent may be sorbitol alone or in an admixture with glycerol or lower polyhydric alcohols. The compositions may also contain linseed or mineral oil, sulphonated castor oil, hardening agents such as formaldehyde (CH_2O), $(CH_2O)x$, and alum, and a preservative or antimould ingredient such as copper sulphate, B-naphthol, or sodium benzoate. The compositions may be used as adhesives, as oil-proof protective films, or impregnants for pressed paper pulp bottles or for woven fabrics, as paint for concrete, as a varnish for artificial leathers and as a coating.

May describes a coating composition made by mixing a solution, in an organic solvent that is nonmiscible or of limited miscibility with water, of one or more substantially water-insoluble materials of the type of resins, natural or artificial rubber, chloro-rubber, and other rubber derivatives, cellulose esters, and ethers, with an aqueous precipitant. This forms an emulsion or dispersion, wherein a quantity of an organic substance capable of swelling in water is less than would be required for the stabilization of the emulsion in the absence of the wetting agent.

A composition for forming a continuous film and suitable for coating paper was developed by Van Meulen. It is prepared from casein or gelatin and contains a water-insoluble salt of a sulphonated vegetable oil in a state of submicroscopic dispersion, and water, in a proportion of 1 to 5 parts for each part of the base material.

Boyce describes a coating composition for use on paper, pulp board, wood, etc. A transparent film is formed which contains gelatin and the reaction product formed by heating glycerol for three hours with a molecular proportion of phthalic anhydride at about 280°.

A painting or coating material develped by Maeda consists of glycerol, formalin, gelatin, salicylic, and acetic acid which is added to a hot solution of carrageen.

Metallic bodies are coated with several thin films of a material comprising gelatin and polyglycerol, each film being subjected to the action of alum formaldehyde and other tanning agents. This coating composition is used for the joints of sectional bodies.

Wendt, Eggert and Trautmann increased the viscosity of gelatin solutions by such compounds as 1-stearoylaminonaphthalenedisulphonic acids and 1-palmitoylaminonaphthalenedisulphonic acids. The solutions are used for coating compositions.

Soap Perfumes

In developing a successful perfume compound for soaps special attention must be paid to careful selection of the base, while top notes, etc.; are generally of less importance as their effect will undoubtedly be lost in the course of storage and under the influence of soap in general. Such bases consists primarily of the less volatile aromatics, ketone, and xylol—the ester of cinnamic acid, all resinoids, extrols, resins, balsams, etc., as well as all aromatics and essential oils generally as far as they possess a comparatively high boiling point. In this connection the decision as to whether or not the soap is to be coloured is of considerable importance as many aromatics, including a great many of the most efficacious ones from the point of view of stability and odour effectiveness, will impart a certain pigmentation on storage. For this reason it is advisable to select a suitable colour for the finished product. The question of discolouration is by no means limited to the heavier types for fancy bouquets. Lilac compositions for instance have a marked tendency to darken the soap due to their content of heliotropin, vanillin, coumarin and frequently indol. Rose compositions on the other hand are much less apt to cause discolouration. A lemon odour, even though by itself an attractive perfume not for an average type of soap, is for instance usually produced by means of citral which not only has the tendency to cause a yellowish discolouration but is moreover quite unstable.

Odour effectiveness, which is to survive long shelf life and extend into the actual use of the soap, is largely dependent upon the use of alkali resisting combinations. Such compounds are for; lily of the valley type, linalol; rose odours, citronellol, geraniol, phenyl ethyl alcohol; hyacinth notes cinnamic alcohol, bromstyrol, lilac complexes, terpinol, heliotrope, heliotropin, hawthorne, anisic aldehyde or better cratacgin, and methylace tophenone; violet, the various ionones; carnation complexes, eugenol and isoeugenol; orange blossom note, neroli (bromelia), *methyl anthranilate*, methyl naphthyl ketone; cloves type, amyl salicylate, coumarin, benzylidence acetone. Certain of these, such as heliotropin, eugenol, isoeugenol and methyl anthranilate, are known to cause discolouration.

It is obvious that the successful composition of a soap perfume necessitates very intimate knowledge of the various ingredients to be used and a thorough system of tests to be submitted before final acceptance or approval. In all, this is a specialised work which it is no small matter to undertake and requires experienced perfume chemists and the necessary equipment for practical tests. This is no doubt one of the main reasons why the creation of soap perfumes is entrusted more than any other phase of perfume making to the experienced graduate perfume chemist with the facilities of a specialized house at his command. It might perhaps be well to add here that such important work is by no means limited to what the layman would consider soaps in the usual sense of the word. It includes

[illegible] for all types of materials which, due to their composition, can be classified as soaps which of course includes the wide variety of creams which have gained such importance in the modern cosmetic industry.

TYPICAL RECIPES

The following recipes will produce good odour of different types of soaps :—

JASMINE

To perfume 100 lbs of toilet soap with a jasmine odour, the following is suitable.

Cinnamic Alcohol	100	grams.
Styrax	100	"
Amyl Cinnamic aldehyde	300	"
Orris powder	30	"

Linanol can be used in jasmine to the extent of 5%, in which case it can replace some of the styrax. Also 10% hydroxy citronellol may be added. To give the finishing touch to a jasmin, 1 gallon of 10% bromostyrol solution is sometimes used. If a good quality of bromostyrol is employed, it greatly helps to bring out the flowery odour.

LILAC

A good lilac perfume which will not darken soaps is the following :—

Hydroxy Citronellol (Residue)	25	grams.
Phenyl Acetic aldehyde (50%)	5	"
Terpinol	40	"
Amyl Cinnamic aldehyde	10	"
Cinnamic alcohol	10	"
Bois de rose	9	"
Styralyle acetate	1	gram.

Patchouli oil may be added as a fixative but not more than 1% should be used.

LILY OF THE VALLEY

For lily of the valley [illegible] following is suitable :—

Linanol	40	[illegible]
Alpha ionone	[illegible]	[illegible]
Iso eugenol	5	[illegible]
Geranium oil Borbon	5	[illegible]
Amyl Cinnamic aldehyde	10	[illegible]
Aldehyde C. 14	1	gram
Musk Xylol	[illegible]	[illegible]

The musk xylol is dissolved in diethyl phthalate or benzyl [illegible]

VIOLET

A very fine perfume for violet [illegible] is given by the following :—

Ionone	20	grams
Methyl Heptin Carbonate	10	"
Orris resinoid	10	"
Bergamot oil	10	"
Cananga	10	"
Hydroxy Citronellal	10	"
Cinnamic Alcohol	10	"
Amyl Cinnamic Aldehyde	10	"
Violet leaves concentrate	10	"
Vetivert oil	10	"
Sandalwood oil	5	"
Styrex Tincture (25%)	100	"
Siam benzoin	15	"
Olibanum oil	[illegible]	"
Musk tonquin	5	"
Civet	25	"

After these oils are mixed, [illegible] 10-20% of orris as an impalpable powder. The orris is poured into a [illegible] mixer, while the oil is dissolved in [illegible] grams of alcohol. The latter is added to the orris powder. The [illegible] mixer is switched on and while it is [illegible] 90 lbs. of soap are added.

To make this perfume cheaper, some of the expensive materials may be used more sparingly or eliminated. The formula can be toned down to any desired price but at the expense of quality.

HELIOTROPE

Musk tincture	¼	oz.
Lavender oil	1½	"
Rose geranium oil	2	"
Bergamot oil	4	"
Peru balsam	5	"

MILLEFLEURS

Clove oil	4	dr.
Cassia oil	4	"
Musk tincture	12	"
Lavender oil	12	oz.
Petitgrain oil	1	"
Cedar oil	2	"
Bergamot oil	2	"

WHITE ROSE

Vetivert oil	6	dr.
Lavender oil	3½	oz.
Musk tincture	10	dr.
Lemon oil	3½	oz.
Bergamot oil	5	"
Geranium oil	6½	"

YLANG-YLANG

Geranium oil	1½	oz.
Cananga oil	10	"
Neroli	3	"
Musk tincture	1½	"

SWEET PEA

Vanillin	4	dr.
Benzylacetate	10	"
Portugal oil	4	"
Geranium oil	3	"
Cananga oil	3½	"
Petitgrain oil	3½	"
Styrax solution	4	"

WASHING SOAP

Perfumes are sometimes required to cover the odour of tallow and oil. A few formulas are given below :—

I.

Lemongrass oil	4	oz.
Cassia oil	4	"
Citronella oil	8	"

II.

Mirbane oil	½	oz.
Caraway oil	4	"
Cassia oil	4	"
Bergamot oil	7	"

III.

Caraway oil	2½	oz.
Lavender oil	3½	"
Gingergrass oil	3½	"
Thyme oil	6½	"

PERFUME FOR CHEAP TOILET SOAP

Perfumes for cold process soap are given below :—

I.

Clove oil	2½	oz.
Cassia oil	5	"
Caraway oil	8½	"

II.

Cassia oil	1½	oz.
Gingergrass oil	3	"
Bergamot oil	5½	"
Geranium oil	6	"

Benefit of Soil Conservation Through Extension Service

SOIL conservation in its widest sense includes not only control over erosion but all those measures and practices which aim at maintaining the productivity of soil at high level through scientific farming methods based on sound principles of soil and water conservation. In this sense soil conservation is closely allied to improvement of land use in general.

Extension service in soil conservation aims at better land use. The best use of land is considered to be one in which land produces the most and deteriorates the least. The success of soil and water conservation programme depends on how effective are the methods that are employed in extension to reach the rural people. Agricultural Extension and Forestry extension both aim at better land use.

In any programme of soil conservation, as suggested by Planning Commission, apart from the inclusion of the measure of controlling erosion, education for soil conservation publicity and demonstration aimed at creating among the general public and especially among the farmers an awareness of erosion problem and what they can do to control it must form a very important part of soil conservation programme.

METHODS EMPLOYED

The means commonly employed in extension teaching may be roughly classified into three groups :—

1. Personal service group, including field visits and Extension Schools.
2. Propaganda group, including bulletins, leaflets, radio news service and general meetings.
3. Object lession group, including demonstration, agricultural shows, exhibits and film shows.

The most effective method of extension is through demonstration in the cultivator's own fields. Extension staff must win the cultivator's confidence in them and at no time should cultivator feel that the extension people are out to cheat them. Confidence of villagers is gained with difficulty and lost easily. It is, therefore, the essence of extension that the initial start is made with items whose usefulness to the cultivator in increasing agricultural production has been well established. This means a study of human psychology which is very essential for the success of the extension programme. A few things at a time is what is needed to be introduced to be more effective, and further more a gradual change of the existing practices must be brought in.

As suggested by the Planning Commission in the First Five-Year Plan, formation of association of farmers for soil conservation work is urgently required. These soil conservation associations will provide a medium through which soil conservation measures can be

taken up on a co-operative basis at the village level.

In India the average farmer units are generally very small. Over and above this, they are fragmented. This makes it difficult to take up soil conservation practices and is also uneconomical from the point of view of management. In consolidation of holding it is carried out either voluntarily or through legislation, the farming units will be more convenient and economical to manage and apply soil conservation practices.

AGRICULTURAL EXTENSION FOR SOIL AND WATER CONSERVATION

Agricultural Extension should aim at scientific and conservation farming, based on sound principles of soil and water conservation with a view to obtain better land use.

The problem of soil conservation has to be tackled both on cultivated as well as wastelands. The problem of soil conservation on lands under cultivation is comparatively easy. Extension will include consolidation of holdings, and introduction of improved methods of cultivation and such practices which will safeguard fertility and make it produce more, and demonstrate such operations as contour ridging, strip cropping, contour cultivation for erosion control, construction of ponds and tanks for irrigation and drainage of irrigated lands. Co-operative effort is what is needed to solve the problem. The problem of soil conservation on wastelands is more of a social problem than technical. Since these lands belong to the community as a whole, these are the most eroded and needed protection most. Since areas constitute a forest problem, such wastelands in the Damodar Valley have been sub-classified as:

1. Gullies—
   - (a) Non-reclaimable and to be tackled as gully area — (to be protected by gully plugging, check dams etc.).
   - (b) Reclaimable for Paddy Cultivation.
   - (c) Reclaimable for Forests (afforestation).
2. Wastelands reclaimable for Paddy Cultivation.
3. Wastelands reclaimable for Uplands Cultivation.
4. Wastelands reclaimable as Pasture.
5. Wastelands reclaimable as Forests.

Most of such wastelands which are unfit for reclamation are recommended for Pasture and Forests. For such areas what is needed is legislation to control grazing (restricted or controlled grazing), protection from excessive filling and fire, till sufficient vegetative cover has come up, after which rotational or controlled grazing is recommended. The practice of shifting cultivation has to be stopped to arrest soil erosion.

Many soils are poorer by use. Organic matter and nitrogen are the keys to soil productivity. A primary factor is reduction of organic matter and nutrient elements particularly phosphate and nitrogen. Tilth is very important and has to be properly maintained. Extension service will distribute seeds of improved varieties, artificial and organic fertilizers and demonstrate to the cultivators in their own fields, the time, method and dose of application to help them obtain increased yields.

[illegible] ...ion of ... by water and wind. [illegible] ...forestry in our ...

A well kept forest is natural best soil holder and nature's great water reservoir. It is well known fact that forests are superior to grass in developing and maintaining a good soil structure in humid tropics. Extensions needed is to impress the importance of forest land use. Farm Forestry Extension will give us the best land use of potential forest lands on farms. Lands less fertile, stony and topographically unsuited to agriculture should be devoted to forestry. Such marginal and abandoned farm lands should be put under forest land use. The aim of Forestry Extension is to advise farmers regarding establishment, protection and management of farm forests. Forestry Extension staff should advise and impart technical imformation upon the relative importance of woodlands on the farms as a source of revenue and as a means of erosion central on slopy and unproductive lands. Assistance of forest department is needed in growing and distributing of planting stock to achieve success of the programme.

social structure and, extension [illegible] must disseminate knowledge of [illegible] and forest practices and [illegible] and interprit in the light of [illegible] requirement desirable practices [illegible] forestry.

Thus, to solve the problem of [illegible] erosion what is needed urgently is [illegible]lation of land use which advocates the use of land according to its capability and introduction of improved land [illegible] practices including afforestation [illegible] eroded areas and use of engineering measures like construction of bunds, check dams,gully plugging, etc.

Education is a pre-requisite of conservation. Hence, it is suggested that soil conservation subjectmatter be introduced in school curricula, and extension schools. This can aslo be done through radio broadcasts, bulletins, newspaper, magazines, articles, text books, and so on.

—FOOD & FARMING.

Scientific Researches and Inventions

DETERMINING RESISTANCE OF POWER OF GLASSES

New experiments for determining the power of resistance of glasses have been carried out at the Central Glass and Ceramic Research Institute, Calcutta. Discrepancies observed in the results obtained by previous workers in the field have been explained in the light of these studies. The power of resistance of glasses, known technically as chemical durability, is largely determined by the ability of the container to resist corrosive action of water or other solvents, aqueous solutions of acids, alkalies and salts, etc. This resistance depends upon several factors such as the composition and surface characteristics of the galss, the nature of the attacking agent employed, and the duration for which it is kept in contact with it, temperature, the shape of the vessel, etc. A number of methods had been employed earlier to determine the chemical durability of glasses. The results obtained by these methods could not be correlated because the chemical durability of glasses is influenced by several factors, and widely varying experimental conditions employed in these methods as the Central Glass and Ceramic employing different physico chemical methods at the Central Glass and Ceramic Research Institute, Calcutta, have succeeded in estimating the ingredients leached out from powdered glasses by water.

POSSIBILITY OF PROCESSING BERYL

Beryl, a mineral of strategic importance found all over India can now be economically used for producing beryllium, an important constituent of lightweight alloys. Investigations initiated under the auspices of the Council of Scientific and Industrial Research reveal that the cost of producing 1 lb. of beryllium oxide varies from Rs. 24 to 29, as compared with the price of $5 per lb. prevailing in the U.S. These results have been obtained from semi-pilot plant scale experiments on the fluoride process for the production of beryllium oxide. It is expected that under actual operating conditions, the cost of production would be of the same order as in the U.S. There was a great demand for beryl during the last world war and production rose to nearly 1,500 tons per annum. The necessity for conserving this mineral was felt after the war was over and all exports were banned. At the same time, investigations were started to explore the possibility of processing this mineral in the country for beryllium oxide and beryllium metal. Although found throughout India, more important deposits of beryl occur at Ajmer-Merwara and Mewa in Rajasthan, in Gaya and Hazaribagh Districts of Bihar and in Nellore District of Andhra State. The preliminary investigations in the problem were first conducted at the India Government Mint Laboratory, Bombay, and then at the Indian Institute of Science, Bangalore.

NEW TYPE OF CRANE FOR RAILWAY YARDS

A prominent feature of the new type of mobile crane now operating on British railways is that all motions of hoist, derrick, slew, and travel are controlled

from one chassis cab. The new crane is lorry-mounted and has a lifting capacity of 7 tons, with 20 ft. standard jib at 10 ft. 6 in. radius. The operator is provided with a swivel seat so that facing forward, he can drive his vehicle into position. He then swivels his seat through 180° to the crane operating position. The controls are of the simplest kind, so arranged that fatigue-free operation over long periods is possible. The request for the new type of crane came from the Eastern Region of British railways, who make extensive use of mobile cranes in their many goods yards. Meetings were held at which the railway engineers met designers and technical experts from the manufacturing firm to discuss their problems. While the prototype was under construction, the railway engineers were given every facility at the firm's works to check their requirements at all stages of the job.

NEW USES OF MAGNESIUM SULPHATE

Magnesium sulphate, a byproduct of the salt industry, can now be used for manufacturing ammonium sulphate according to experiments carried out at the National Chemical Laboratory, Poona. Experiments have also revealed that the Magnesium Sulphate offers possibilities for the saving of sulphur and as substitute for gypsum.

The treatment of a saturated solution of magnesium sulphate with ammonia and carbondioxide converts 74 per cent of the magnesium sulphate into ammonium sulphate. The unreacted ammonium sulphate separates out as a double sulphate of ammonium and magnesium known as nitro-magnesia of commerce. This itself is a useful mixed fertilizer particularly for soils deficient in magnesium. The nitrogen in nitro-magnesia is released slowly in the soil in the early stages of growth, the supply increasing later during the time of maximum demand.

Light magnesium carbonate and light calcium magnesium are valuable by-products obtained in the process, fuller details of which are contained in an article being published in the next issue of the Journal of Scientific and Industrial Research. P.I.B.

NEW LABEL PRINTER

A new Tickopres Imprima machine is announced by Dapag (1943) Ltd., makers of the Tickopres range of overprinting and marking machines.

The new Imprima (Model V) incorporates many new and improved features. An extended feed-tray giving greater facility for easy feedins of labels is fitted, and amongst its features are quick action and automatic looking ticket guides. The type-drum is interchangeable which avoids the need for re-setting of type matter which is constantly being used. The type-drum is also fitted with an extra-large elongated slot giving a wider range of adjustment for all types of tickets. The inking oscillating roller has been made foolproof by the use of locked mechanism and a new design of cover gives a more streamlined appearance and protects the roller spindle ends from dust and dirt.

All bearings are now "Oilite", requiring no lubrication whatsoever and other improvements include a new selection of design setting controls for different thickness of paper, card, etc., a new type drawer with receptacles for type clips and an automatic stripper fitted to eliminate entirely the risk of labels being caught up

in rollers should the ink be too wet. A built-in counter is also fitted.

The full Tickopres range comprises machines designed to provide the complete answer to every ticket, label and tag problem. Tickopres machines effect considerable savings in time, and operating costs are negligible since any boy or girl in the office or factory can easily produce perfect results.

CORROSION RESISTANCE OF TIN PLATE

A paper by S. C. Britton and R. M. Angles. J. Appl. Chem. 5 (1954) 351-364 reports that the corrosion of tin by hot sodium hydroxide solution is retarded by larger additions. Tinplate immersed in solutions containing sufficient chromate remains bright and acquires an improved resistance to some other forms of corrosion; the pores of the tin coating rust less easily in the atmosphere and the tin surface becomes much more resistant to staining by sulphur-containing materials and to oxidation by heating in air.

The authors recommended the use of solutions slightly modified from those developed by Kerr at the Tin Research Institution. This latter process has been protected by patents and brought into use as the "Protecta-tin Process." The author's modifications have been successfully tested in the experiments described in the present paper which are concerned with the canning of food products and with the weathering of tin cans.

V.P.I. PAPER FOR RUST PREVENTION

The initials V.P.I. stand for "vapour phase inhibitor," a new corrosion inhibitor, a product of the research laboratories of the Royal Dutch-Shell group of companies. When used in the form of a coated paper it provides a new and radically different method of rust prevention. It is said to be the most complete and yet the most simple means of eliminating corrosion.

Its mode of action is untrue in that it prevents rust even though moisture and oxygen are both present. A tightly sealed package is not necessary because the chemical is in fact a compound that makes the water non-corrosive. It is slightly volatile and, in a package, it vapourises slowly from the coating on the wrapping paper, permeates the air and forms a completely non-corrosive local atmosphere. Condensed water on a metal surface within the package rapidly absorbs the vapour and becomes incapable of causing rust. Immediate contact between the paper and the metal surface is not necessary. The chemical neither reacts with nor removes water or oxygen, it is not consumed by its protecting activity, and, owing to its low volatility, it is easily retained within the package.

The advantages of using V.P.I. coated papers for packing objects subject to corrosion reside in the simplicity of the method, the cleanliness and sales appeal of the package, all qualities being available at low overall costs.

V.P.I. coated paper is being produced and supplied by Leonard Stace Ltd., York Place, Swindon Road, Cheltenham, Gloucestershire.

FILTER PAPERS FROM NOVEL MATERIALS FOR THE ANALYTICAL LABORATORY

The search for new filtration media based on synthetic materials is now in full course. In this connection Schleicher and Schüll's "Selecta-Rhovyl Filters" based

on PVC deserve special mention. The new "paper" is made of felted PVC fibre of 1.7 denier, consolidated by heating to a point of incipient softening.

The usefulness of the new filters has been tested by reference calcium oxalate and barium sulphate precipitates, which can yield particles of varying size according to temperature conditions. Generally speaking these precipitates will be fine grained when obtained in the cold, but relatively coarse-grained when precipitated at higher temperatures. The results are as follows:— calcium oxalate (hot) as good as paper, and barium sulphate (cold) better than paper.

The solubility of the new filter, in the usual liquids used for these reactions, is between 1-2 per cent. All but 1|10 of this amount is made up of volatile substances. The corresponding figures for paper are not very different. The new material is expected however to score on account of its suitability for the filtration of highly acid or alkaline fluids.

THE FEEDING OF IODINATED PROTEIN AND THYROXINE TO DAIRY COWS

The temporary stimulation of declining milk yield in dairy cattle is shown to be best achieved by feeding pure synthetic thyroxine mixed with the concentrated ration. Pure 1-thyroxine appears to be preferable in most respects to iodinated casein as an agent for this purpose. Periods of treatment should not exceed 6 to 8 weeks. Older cows give better results than younger ones. Provided the amount does not exceed 80 mg. per day during the period neither the immediate nor the long-term elect on the health of the cows is significant (at least in well-managed herds). If twice the amount is fed adverse effects may follow. The total lactation yields are not [illegible] affected by thyroxine treatment.

THE PRODUCTION AND [illegible] SYNTHETIC PHENOL

The world's demand for phenol [illegible] continuously rising, and without the [illegible] of synthetic methods one would be [illegible] unable to satisfy this need. There are at present four main synthetic processes used for this purpose:—

Sulphonation Process. The [illegible] benzene-B-sulphonic acid alkali melt— sodium phenate—phenol.

Chlorination process. Benzene— chlorobenzene—alkali treatment—sodium phenate—phenol.

Raschig Process. This is a modified chlorination process with the following stages. Benzene and gaseous HCl react to form chlorobenzene which, by catalytic decomposition gives phenol and HCl.

Cumol-process. Benzene + propylene — isopropyl-benzene —isopropyl-hydroperoxide—phenol + acetone.

The economics of the various processes are dependent on the local availability of sulphuric acid, chlorine, caustic soda and electric current. The second pair of processes are almost certain to gain ascendancy over the first pair. At present American synthetic phenol production is made up as follows:— Sulphonation process 25 per cent, chlorination process 34 per cent, Raschig process [illegible] per cent, Cumol process 14 per cent, other processes 5 per cent.

The Cumol process [illegible] materials furnished by the petroleum industry.

Pharmaceutical Preparations

BILIOUS & LIVER MIXTURE

Acid nitro-hydrochlor dil.	1	dr.
Inf. gentian co. conc.	½	oz.
Ext. taraxaci liq.	½	"
Tr. nuxvomica	1	dr.
Tr. podophylli	40	min.
Tr. ginger strong	½	dr.
Chloroform water	6	oz.

LIVER PILLS

Podophyllin	3	grains
Socotrinne aloes	7	"
Mucilage of acacia	q.s.	

Mix. Divide into 24 pills and coat with sugar. The entire 24 pills should weigh about 15 grains.

ANTIBILIOUS PILLS

I.

Mercury subchlor	½	gr.
Aloes powder	2	"
Rhubarb powder	1	"
Ginger powder	¾	"

II.

Extract of taraxac	1	gr.
Extract anthemidis	1	"
Rhubarb powder	1	"
Ginger powder	1½	"
Powdered aloes	1½	"
Oil caraway	¼	min.

ANTIBILIOUS TABLET

Calomel	½	oz.
Compound extract of colocynth	2½	"
Ipecacuanha root, powder	30	gr.
Oleo-resin of ginger	1	dr.
Milk sugar	1	oz.
Simple syrup		q.s.

Mix to a slightly damp powder, pass through a 20 hole sieve, dry and compress into 15 gr. tablets. Make 4 gr. tablets.

ANTIBILIOUS & LIVER PILL

Podophyllin	¼	gr.
Rhubarb pill	2½	"
Ext. hyoscyami	2	"

INDIGESTION & LIVER MIXTURE

Bismuth	80	gr.
Pulv. tragacanth	80	"
Potassium bicarbonate	80	"
Tr. Nuxvomica	40	mins.
Spt. chloroform	80	"
Inf. gentian Co. conc.	1	oz.
Menthol water to make	8	"

One tablespoonful thrice daily.

PTYCHO-SODA TABLET

Sodium Bicarbonate	5	lbs.
Oil of Thymol	1	oz.

Thoroughly well granulate the soda and incorporate with thymol. The die for the tablet is 5/16 th. inch and each tablet weighs 5 grs.

This is the variety usually sold in bulk and in package for retailing.

LAXATIVE PILLS

Ext. Cascarilla	1	gr.
Rhubarb powder	½	"
Podophyllin	⅛	"
Ext. Belladonna	¼	"
Ext. Aloes Soc.	½	"
Ext. Nuxvomica	⅛	"
Oleo-resin Ginger	1/16	"

This makes one dose.

[illegible]

Aromatic chalk powder	10 oz.
Bismuth subnitrate	15 "
Pepsin	1 "
Milk sugar	9 "
Simple syrup	q.s.

Make 5 gr. tablets.

CHOLERA MIXTURE

Aromatic chalk powder	9 gr
Spirit of sal Volatile	9 min.
Tincture of Catechu	30 "
Compound Tincture of Cardamoms	18 min.
Tincture of opium	3 "
Chalk Mixture to make	1 fl.oz.

CHLORODYNE

Chloroform	1 fl.oz. 96 m.
Morphine hydrochloride	44 gr.
Tincture of Indian Hemp	188 m.
Tincture of Capsicum	144 m.
Liquid Ext. of Liquorice	2 fl.oz. 192 m.
Mucilage of Gum Acacia	2 fl.oz. 192 m.
Treacle	5 fl.oz.
Glycerine	4 fl.oz. 192 m.
Spirit of peppermint	96 m.
Alcohol 90 p.c. to make	20 fl.oz.

Dose : 1 oz.

WORM MEDICINES FOR CHILDREN

Santonin	120 gr.
Calomel	90 "
Powdered sugar	500 "
Chocolate	250 "
Essence of vanilla	15 drops
Syrup	to form a mass.

Divide into 100 cakes. Allow to dry. Dose is one cake; half a cake for a young child.

SEIDLITZ POWDER

(a) Sodium Potassium Tartrate	7.5 grammes.
Sodium bicarbonate	25 "
(b) Tartaric acid	25 "

[illegible]

Put (a) in blue paper, and (b) in [illegible] paper. When required for use, [illegible] (a) in cold or warm water [illegible] add (b).

FRUIT SALT

The following is a popular [illegible]tute for the wellknown Eno's [illegible]. But the word "Fruit Salt" being [illegible] mark cannot be used.

Tartaric acid	2 [illegible]
Sodium bicarbonate	[illegible]
Magnesium sulphate	1 [illegible]
Potassium bitartrate	2 [illegible]
Magnesium citrate	2 [illegible]
White sugar	4 [illegible]

Powder and mix.

CONCENTRATED ANTISEPTIC MOUTH WASH

I.

Carbolic acid	2.75 p.c.
Glycerine	12 p.c.
Chloroform	2.75 p.c.
Potash solution	2.75 p.c.
Distilled water	75 p.c.
Tincture of cochineal	4.75 p.c.

Mix the first three. Mix potash with water and the first solution. [illegible] and finally add cochineal. Filter.

II.

Phenol	3 [illegible]
Glycerine boracis	1 [illegible]
Chloroform water	[illegible]
Colour	to taste.

MOUTH WASH POWDER

Sodium perborate	990 parts
Thymol	1 part
Menthol	1 "
Methyl Salicylate	11 parts
Eucalyptol	5 parts
Clove oil	11 "

Mix the flavours with a little alcohol and spray in the perborate. Allow the alcohol to evaporate and pack at once.

Recipes for Small Manufacturers

ARTIFICIAL ROSE WATER

Rose oil	2.5	grams.
Clove oil	0.25	,,
Alcohol to make	1000	c.c.

Now take 10 c.c. of this spirit, mix with 1000 c.c. of boiling distilled water and allow to stand until it has undergone the viscous fermentation and blend producing a stuff superior to most of the commercial rose water.

SILVERING POWDER

Silver chloride	1	tola.
Common salt	1¼	tolas.
Washing soda	3	,,
White chalk powder	2¼	,,

Powder each separately and weigh in a well dry condition and mix well the whole and pack it in 1 oz. size screw top or wide mouthed cork bottle.

For silvering the articles made of brass, copper, German silver, etc., first clean them well with chalk powder and wash with clean water. After cleaning the article from dirts and dusts apply this silvering powder with a small piece of clean cotton rag when the article is wet. Rub briskly all over the place with this powder for some time and wash with water. Two or three coats in this way will give a good deposit of silver on the articles. To get cleaner and brighter surface on the article it must be cleaned thoroughly before applying this powder.

SOLID STENCIL INK

Black rosin	20	parts by weight
Shellac	16	,, ,,
Bone black	14	,, ,,
Rosin spirit	2	,, ,,
Japan wax	22	,, ,,
Tallow	1½	,, ,,

Hard yellow soap ½ part by weight

Melt the rosin, shellac, and rosin spirit, and the tallow and wax, stir well, and bone black and soap (sliced), stir until all dissolve and incorporate, then turn out into the moulds to set hard.

TAMBUL BIHAR

Liquorice powder	24	parts.
Pollen of Keora	24	,,
Seeds of cardamom major	3	,,
Seeds of cardamom minor	3	,,
Cloves	3	,,
Cinnamon	3	,,
Rose water		q.s.

Mix the above ingredients together and macerate in a stone mortar with requisite quantity of rose water. Then add finely pulverised saffron, 3 parts.

VERMILION

Take 4 seers of red lead powder, 2½ seers of zinc white, ½ seer of venetian red No. 1 powder, and 1 seer of vermilion dye. Macerate these ingredients thoroughly in a stone mortar and set aside for 24 hours in a cool place. Finally pound it and pack.

ARTIFICIAL VINEGAR

Acetic acid 80%	½	gal.
Acetic ether	2	oz.
Water	25	gal.

Caramel colouring to suit.

Mix and keep aside for a month to mature. Then strain and bottle.

WAX PENCILS

Ceresin	40	parts.
Carnauba wax	32	,,
Japan wax	24	,,
Talc	50	,,
Colour		q.s.

Melt the waxes together, add the talc and colour, and heat on a water bath for approximately 30 minutes, then pour into

suitable moulds.

The colours used are:—

White—Zinc oxide	15	parts.
Blue—Paris blue	12½	,,
Red—Cinnabar	15	,,
Yellow—Chrome yellow	15	,,
Black—Lampblack	8	,,

LIQUID SHAMPOO

Olein	220	lbs.
Coconut Oil Fatty Acids	160	,,
Triethanolamine	200	,,
Alcohol	110	,,
Water	110	,,

OIL SHAMPOO

Sulphonated Castor Oil (75%)	65 g.
Sulphonated Olive Oil (75%)	28 ,,
Best Mineral Oil	5 ,,
Ethylene Glycol	2 ,,

Perfume to suit.

PERFUMED HAIR OIL

Castor oil	12	oz.
Alcohol	5	,,
Lemon oil	0.5	,,
Lavender oil	1	dr.
Bergamot oil	2	,,
Cinnamon oil	10	drops.
Clove oil	10	,,
Citronella oil	10	,,
Tincture of Turmeric	1	dr.

HAIR POMADE

Tallow	390 g.
Ceresin, White	150 ,,
Beeswax, White	50 ,,
Rosin Pale	200 ,,
Mineral Oil, White	200 ,,

Perfume.

SULPHUR HAIR TONIC

Alcohol	60 kg.
Sulphurized oil	1 ,,
Boric acid	2 ,,

Portugal essence	[illegible]
Water, distilled	[illegible]

NAIL CREAM

a.	Beeswax white	15.0 g.
	Ozokerite, white	2.5 g.
	Montan wax, bleached	2.5 g.
	Mineral oil	60.0 g.
	Cetyl alcohol	2.0 g.
b.	Water	23.5 g.
	Borax	1.5 g.
c.	Aluminium stearate	20.0 g.
d.	Fish silver paste (10% Dispersed in Amyl Acetate)	5.0 g.

Melt a, add b of about 70°C. Stir thoroughly, add c. Stir until the emulsion is almost cold, add d.

CUTICLE CREAM

White petroleum oil	87.75 g.
Paraffin wax (M.P. 125°F.)	9.00 g.
Menthol	3.00 g.
Thymol	.025 g.
Colour (Oil Soluble Red)	to suit.

SOLID EAU DE COLOGNE

This is generally considered as a more or less transparent alcohol soap. One method is to dissolve 8.5 g. of stearic acid in 50 g. of 90 per cent alcohol. To this 1.3 g. of sodium hydrate dissolved in 40 g. of water are added. The mixture is warmed until it becomes clear. Now add essence of Eau de Cologne carefully congealing action. Pour into moulds and allow to set.

LIQUID FACE POWDER

Zinc oxide	200 g.
Titanium dioxide	50 g.
Talcum	30 g.
Eau de Cologne	100 g.
Rose water	500 g.
Glycerin	20 g.

Formulas, Processes & Answers

GLYCERINE FROM WASTE LYE

The following method of extracting glycerine is generally followed by manufacturers: The soap lye, which contains 3 to 8 per cent. of glycerol and 8 to 14 per cent. of salt, is cooled and a little lime added to precipitate the fatty acids as lime salts, the precipitate is then neutralised with acid, any fatty acids which separate being skimmed off. It is evaporated in a lead-lined vessel until it has a density of 34°Be. A considerable amount of salt separate during evaporation, and is removed from the vat when it is emptied. After the removal from the evaporate the crude glycerine is allowed to stand so that any suspended salt may subside, it is then pumped into a large copper still in which it is distilled by menas of steam which is superheated to 350°C by passing it through a coil of pipes in the fire place below the retort, a vacuum being maintained throughout the plant by means of a pump. The glycerine is condensed in a series by atmospheric condensation.

The glycerine obtained by the above process is not quite pure, since it contains some water and is coloured more or less yellow by traces of organic matter. The water is removed by heating it in a pan with a closed steam coil until it reaches a density of 1.26 when it is sufficiently pure to be used for most commercial purposes.

MANUFACTURE OF SACCHARINE

573 M.S.B., Bombay—Wants to manufacture saccharine.

Saccharine is a compound remarkable for its sweetness. It is made from toluene, of which large quantities are produced in the manufacture of coal gas. The process which is a most complicated one, put briefly is as follows. The toluene is treated with sulphuric acid, yeilding ortho and paratoluene sulphonic acids which are then converted into calcium salts and further into sodium salts by treating with sodium carbonate. The next step is to act on them with phosphorous trichloride and a current of chloride, the produce being a mixture of sulphuric chlorides.

These chlorides are separated by crystallisation, orthosulphonic chloride being retained. The ortho-compound is next treated with ammonium carbonate and steam being thus converted into toluenesulphonic acid which by oxidation with potassium permanganate yields saccharine. It is generally estimated that sweetening power of saccharine is 500 times of sugar; if one grain of saccharine is added to a gallon of water sweetness is plainly perceptible.

TINCTURE OF IODINE

342 L.L.B.S., Calcutta—Wants to know the process of manufacturing tincture of iodine.

Iodine . . . . 100 grams.

[illegible] [illegible] grams
Distilled water 100 "
Alcohol (90 p.c.) sufficient.

The potassium iodide and iodine are dissolved in the distilled water. Finally add alcohol to produce the required volume.

TOOTH PASTE

237 C.R.S.T., Bombay—Wants to know the formula of tooth paste.

Precipitated chalk	25	parts.
Neutral white soap	2	"
Magnesium carbonate	8	"
Bentonite	3½	"
Sodium bicarbonate	6	"
Glyceriate of starch	28	"
Irish moss infusion (2%) in water	28	"
Saccharine	⅛	"
Flavour	1	"
Liquid paraffin	1	"

Mix in a paste mill and put in collapsible tubes.

WATERPROOFING CLOTH

387 A.R.D., Kanpur—Desires to know the process of waterproofing cloth.

Waterproof is of two general kinds one, when chemical treatment of the fabric results in the deposit of chemical substance that is water repellent, and the other is when a water-repellent is applied directly. The first named process is as follows: Prepare a solution of acetate of alumina standing at 90°Tw., and heated to 100°F. Prepare a second solution of 25 gallons of water in which is dissolved about 25 lbs of soap, heated to 100°F. Pass the goods first through the acetate solution [illegible] and then [illegible] soap solution, and dry. This [illegible] insoluble deposit of an alumina [illegible] the goods, and fabric is [illegible] water-repellent.

The other process consists of impregnating the cloth with a solution of paraffin wax and stearic acid in benzene. About two or three ounces of equal parts of paraffin and stearic acid per gallon of benzene makes a most satisfactory proportion. After impregnating the goods, the fabric is dried in a machine provided with a condenser, so as to recover the benzene for reuse. Fabrics so waterproofed are practically impervious to water and the proofing lasts even longer than the utility of the fabric.

IRIDIUM POINTED GOLD NIB

435 R.L.D.S., Bombay—Wants to know the process of making iridium pointed gold nib.

In making gold nibs, gold is melted and alloyed to about 14 carats fine with suitable proportions of silver and copper, and rolled into a long narrow ribbon from which penblanks of flat plate in the shape of a pen are cut by means of punch and die in a power press. The blunt nib of the blank is notched or recessed at the end to receive the iridium that form the exceedingly hard point which all good gold pens possess. The iridium is coated with a cream of borax ground in water, and laid in the notch formed in the end of the blank. It is then secured by a process of sweating, which is nothing more or less than melting the gold of which the pen is formed so that it unites solidly with the iridium. The blank is then [illegible]

between rollers of peculiar form to give the gradually diminishing thickness from the point backward. The rolls have small cavity in which the extreme end of the iridium pointed nib is placed, to prevent injury to the iridium. After rolling the nib of every pen is stiffened and rendered spongy by hammering.

The pen is then trimmed by a press similar to that which is used for cutting out the blanks or by automatic machinery. When the blank has been trimmed, the name of the manufacturer and the number of the pen is stamped on it. The pen is then given its convex shape in a suitable press, the blank being pressed between a concave die beneath and a convex punch above. Quite a little force is necessary to the required convexity, and when this operation is completed two jaws approach the blank and press it upon the opposite edges, thus giving the pen its final shape. The next step is to cut the iridium into two points by holding it on the edge of a very thin copper disc, which is charged with very fine emery and oil and revolves at a high speed. The nib is then slit by a machine and the slit is cleared by means of a fine circular saw. After slitting, the nibs are brought together by hammering, and the pen is burnished on the inside in a concave form and on the outside in a convex form. This is necessary in order to give the pen a uniform surface and greater elasticity. These nibs are then set by the fingers alone, after which operation the pen is ground by a lathe with a steel disc and a copper cylinder, charged with fine emery and oil. After the grinding is done, the pen is polished upon a buff wheel, which completes the process of manufacture. Lastly the finished pen is inspected to see that it possesses the proper elasticity, fineness, and weight before fixing.

REMOVING PIMPLE MARK

297 B.R.K., Kanpur—Wants to know the process of removing pimple mark.

Lactic acid	3 parts.
Citric acid	7 "
Water	40 "
Lanolin	40 "
Cetyl alcohol	100 "
Soft paraffin	800 "
Rhodinol	10 "

Dissolve the acids in the water and heat into the melted mass of lanolin and soft paraffin. Then add the rest of the ingredients and emulsify for a few minutes.

INCANDESCENT MANTLES

527 F., Karachi—Wants to know the process of manufacturing incandescent mantles.

Mantles are knitted from artificial silk fabric, cut into suitable lengths and stitched. These are next dipped in the following impregnating solution :—

Thorium nitrate	1000 parts.
Cerium nitrate	10 "
Magnesium nitrate	1½ "
Beryllium nitrate	5 "
Distilled water	2000 "

Mix. The time of immersion of the artificial silk mantles varies from about 2 minutes to about 15 minutes according the nature of artificial silk.

Reader's Business Problems

[Reader's business problems will be discussed in these pages. We invite the [illegible] write us his difficulties. As the department is in charge of an experienced businessman [illegible] specially adept in dealing with such problems and to whom experiences of a large [illegible] of successful businessmen are available, his replies will lead the enquirer to a [illegible] These replies will be published in the paper only and cannot be communicated by post.]

ESSENTIAL OF MANUFACTURING BUSINESS

258 B.B.S.P., Chirala—I am a graduate. I wish to begin a business. Will manufacturing business be profitable? What articles should I manufacture with a small capital?

Answer:— Political movement during the last few years has achieved one great object namely—it has increased demand for Indian goods far and near in the country. The young and learned men of our country also without losing time have taken the stock of the situation. Demand of articles manufactured in our country is not less now a days. So manufacturing business is profitable no doubt.

Success in any manufacturing operation involves:— (a) A demand for the goods manufactured. (b) ability to manufacture these goods or articles as cheaply as possible without affecting its quality and quantity. (c) Facilities for putting the manufactured products before the customers and presenting at least equal and, if possible, the largest inducement for him to buy.

Time, money and skill will suffice to make almost anything, but everything is lost if—nobody wants it. Again profit comes of selling—not of making. Our leader should bear all these points and ponder over them before he begins to manufacture anything.

With small investment he may begin to manufacture soap, hair oil, coir, etc. of which demand can scarcely decrease.

A NEWS STAND

23 L.L.B., Dacca—Writes. I have a capital of Rs. 500 which I have borrowed from one of my friends. Now I wish to start a business so that I can get a decent return. Will you please suggest a profitable business?

If you are very earnest for starting any independent business I would suggest you to begin your career as newsboy. First [illegible] very suitable place preferably in the [illegible] the town. Then erect a news stand after [illegible] necessary licences. This will cost you [illegible] little. The great advantage of this business [illegible] that it has no dead stock. Unsold papers [illegible] magazine are returnable. The publishers [illegible] the risk.

I think the capital you have got will [illegible] sufficient for starting the above business [illegible] you can earn decent living out of it. [illegible] else in business makes as many profits on [illegible] capital as a newsboy does. You will [illegible] good chance to develop your line of [illegible] novels and other books of common interest. [illegible] may also sell stationery articles required [illegible] School and College students.

For further developing your [illegible] may put a signboard "You may order [illegible] book here".

As soon as you become acquainted [illegible] customer, you can ask. "Is there any [illegible] that you would like regularly?" [illegible] customers buy from several news [illegible] Consequently you should try to [illegible] their trade.

You should remember if you [illegible] every regular customer wants, and [illegible] him without being asked. That will help you to keep your customers.

Further this business has ample [illegible] be developed to a publishing house. [illegible] personally know some of the premier [illegible] who began their career as newsboy. [illegible] prosper in his business you should [illegible] the business and do not leave it if you [illegible] any difficulty in the beginning and [illegible] likely to make mistakes at first. [illegible] ample self-confidence and [illegible] must keep on and work hard.

Queries and Replies

[illegible] S.R.C.W., Hoshiarpur—For selling [illegible] oil you may negotiate with the following firms: A.D. Coomar & Sons, 12-C, Clive Row; [illegible] Kumar Laha, 1, Dharamtala Street; [illegible] Dutt & Co. Ltd., 35 Netaji Subhas Road and D. Mullick & Co., 19, Bonfield Lane; all of Calcutta.

[illegible] E.N.S.N., Alwaye—We are glad to learn that you intend to start some business and you have sought our advice. We may suggest you to start a business dealing in local products. You may also import articles from Bombay, Calcutta and Delhi. You should also study the local market regarding demand and supply of goods.

[illegible] G.T.C., Cochin—As far as we know fused fluorescent tubes cannot be used again.

[illegible] A.T.A., Madras—For G.I. fittings you may enquire of Indian Engineering & Fitting Works, 115, Netaji Subhas Road, Jogendra Nath Chatterjee & Sons Ltd., 21, Maharshi Debendra Road; Anand Engineering Corporation, 137, Canning Street and Bengal Light Casting Co. Ltd., 21, Maharshi Debendra Road; all of Calcutta.

637 J.R.D., Jugsalai—Following is a process of manufacturing carbon paper: Lamp black 10 parts: Olive oil 10 parts: Ceresine wax 8 parts; Petroleum ether 20 parts. Rub the lamp black and oil together in a mortar adding the oil little by little then put in a pan and after heating it a little add the wax. When this is melted and mixed remove the pan from all fires and lights and add the ether. Apply the mixture over the paper and then place it in the oven for about 20 minutes, so that the mixture may thoroughly soak in. Take from the oven and wipe off any moisture with a [illegible] rag, then hang up to cool. Prussian blue may be added to the black to intensify it or to [illegible] a blue shade.

[illegible] S.B., Belgaum—Following is a process of making coffee tablets: Take roasted [illegible] and grind it to coarse powder by means of grinding machine. Then mix chicory in [illegible] parts of coffee or according to the taste of manufacturer. Then put the mixture in an [illegible] machine and press into [illegible]. The size and shape of the tablets vary with the manufacturer. Some tablet manufacturers do not add any binding material but others add about 15 per cent glucose.

639 H.S.U., Trichinopoly—Wants to be put in touch with I.C.W. of Vellore.

640 K.L.B., Calcutta—Following is a formula of bedbug killer: Kerosene 90 fl.oz.; Clove oil 5 fl.oz.; Cresol 1 fl.oz.; Pine oil 4 fl.oz. Simply shake and bottle.

642 P.R.B., Patna—For photographic materials you may enquire of the following firms: Chowringhee Camera Stores, 10, Chowringhee Road; Photographic Stores & Agency Co. Ltd., 154, Dharmatala Street and Ilford Selo (India) Ltd., 15, Chittaranjan Avenue; all of Calcutta.

643 L.L.B., Banaras—Following is a formula of slate pencil: Powdered slate 60 parts; Powdered limestone 30 parts; Sodium silicate 10 parts. Knead together all the ingredients to form a plastic mass and then force it through metallic tubes of suitable diameter fitted with piston. Afterwards cut off into usual lengths and bake over a slow fire. Process of manufacturing fountain pen will be found in Mechanical Industries published from this office, price Rs. 3/12/- including postage.

645 K.R., Coimbatore—Special type textile machine is required for making surgical cotton, lints, etc. For machine you may enquire of W.H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta.

646 N.G., Calcutta—Your enquiry is engaging our attention.

647 O.P.S., Rohtak—We are not aware of any such University either local or foreign.

648 P.R.K., Cochin—Following is a formula of chalk crayons: Precipitated chalk 8 oz; China clay 5¼ oz.; Oleic acid 6¾ oz.; Caustic soda 1 oz.; Water q.s. Mix the oleic acid and caustic soda, after warming them separately. Then add to the clay and chalk mixed with enough water to bring to about the consistency of putty. The mixing must be done in a standard type dough mixer or other clay mixing equipment. Then cast into sticks of the usual size and bake over moderate heat. You may also consult Prospective Industries published from this office, price Rs. [illegible] including postage.

[illegible]

[illegible] Methyl salicylate 2 oz.; Oil of cajuput 1 oz.; Oil of eucalyptus 1 oz.; Peppermint crystals 1 oz.; Wool fat 10 oz. Melt the vaseline and wool fat over slow fire and then remove from the source of heat and mix the heat and mix the other ingredients with stirring. Continue stirring until the mass is almost solidified.

650 J.R.D.S., Bombay—Following is a recipe of depilatory cream: Barium sulphide 30 grms.; Atropine 5 grms.; Spermaceti 100 grms.; Distilled water 200 grms.; White petrolatum 300 grms. Melt over a water bath and mix and put in pots. This cream can be used as depilatory.

652 I.K.M., Panoor—Ghee is manufactured from butter by heating over slow fire. It is not manfactured from mutta and groundnut oil as you have stated in your letter.

653 U.T.C., Bombay—For handicrafts you may enquire of Aligarh Metal Industries, Manak Chowk, Aligarh; B. Karamchand Payaralal, Moradabad; Tableware Craft Cottage, Kunwar Bldg., Station Road, Moradabad; Ram Narain Shamnarain, Railway Station Road, Moradabad; Oriental Art Emporium, Moradabad and Jafar Ali, Mohalla Nahadpur, Moradabad.

656 B.K.D., Balrampur—Process of manufacturing rubber stamps will be found in Manufacture of Rubber Goods published from this office, price Rs.3/12/- including postage. We have no book dealing with manufacture of foot rule.

657 K.C.S., Netrokona—We have no book dealing with the arrangement of cold storage. For cold storage equipment you may enquire of American Refrigerator Co., 12D, Park Street; British Refrigerators, 30A, Chowringhee Road and M.S. Vernal & Co., Bharat Insurance Bldg., Chittaranjan Avenue; all of Calcutta.

658 D.P.H., Nagpur—Used lubricating oil should be filtered through a special kind of filtering machine to be used again.

660 J.C.F., Lalamusa—Process of manufacturing all sorts of ink will be found in Manufacture of Ink published from this office, price Rs. 3/12/- including postage. Process of manufacturing nigrosine will appear in due course.

661 F.S.M., Madras—Process of tin printing will be found in December, 1954 issue of Industry. Ordinary offset printing machine [illegible] on the [illegible] & Co (1949) Ltd., [illegible]

663 H.T.P., [illegible]—Glass [illegible] bottles may be had of Imperial Glass [illegible] 9, Sura Street; Krishna Silicate and Glass [illegible] Ltd., 17, Radha Bazar Street; [illegible] Works Ltd., 35, Chittaranjan Avenue; [illegible] Victoria Glass Works, 10, Swallow Lane [illegible] Floor; all of Calcutta. Wants to be [illegible] duced to the exporters of [illegible] vegetable oils and white oil.

666 P.T.G., Kunnarkulam—For [illegible] tain pen making machine enquire of [illegible] Herbert (India) Ltd., 13/3, Strand [illegible] Calcutta and Oriental Machinery Supply Agency Ltd., P12, Mission Row Extension, Calcutta.

667 P.N.M., Calcutta—Following [illegible] formula of tea flavouring: Rose oil [illegible] Neroli oil 34 drops; Cognac oil 200 [illegible] Lemon oil 1½ oz.; Vanillin 5 oz.; [illegible] acetate 5 oz.; Ethyl formate 1 lb.; [illegible] butyrate 2 lbs.; Ethyl acetate 2 lbs. Mix [illegible] keep in stoppered bottle for use. [illegible] chemicals may be had of Ghose Bros., [illegible] Street, Calcutta.

668 K.M.Y., Erode—Can supply [illegible] in large quantity.

669 M.P.J., Sourashtra—Following [illegible] formula of waterproof leather cement: [illegible] crude pale crepe rubber 40 lbs.; Powdered rosin 90 lbs.; Benzoate make 100 gal.

670 M.G.A.P.S., Mangalore—For [illegible] required enquire of Francis Klein & Co. [illegible] 1, Royal Exchange Place and Alfred Herbert (India) Ltd., 13/3, Strand Road; both [illegible] Calcutta. For securing services of an [illegible] in strawboard or cardboard factory [illegible] advertise in newspapers.

671 J.M.P.C., Hubli—Following [illegible] formula of coffee tablets: Take roasted [illegible] and grind it to coarse powder by [illegible] grinding machine. Then mix chicory [illegible] in the proportion of 2 parts of chicory [illegible] 8 parts of coffee or according to the [illegible] manufacturers. Then put the mixture [illegible] automatic pressing machine and press [illegible] tablets. The size and shape of the tablets [illegible] with the manufacturers some tablet [illegible] facturer do not add any binding material [illegible] others add about 15 per cent glucose.

672 B.J., Calcutta—Process of manufacturing all kinds of fountain pen ink will be found in Manufacture of Ink published [illegible]

[illegible] price Rs. 4/12/- including postage.

[illegible] S.K.S., Salem—Process of manufacturing [illegible] thread will appear in due course.

676 C.D., Teni—Envelope cutting machines may be had of Record Engineering Works, 1st [illegible] Street, Bombay and Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

677 C.V.K., Kurla—Pour sufficient quantity of water to hydraulic lime to make it in pasty form. Now put in air-tight bottles. Candle making machines may be had of Small Machineries Mnfg. Co., 22, R. G. Kar Road, Calcutta and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

678 V.N.R., Berhampur—For auto motor cycle rickshaws write to India Automobiles, [illegible], Faiz Bazar; Kumar Automobiles, Roshan [illegible] Road; Pearey Lal & Sons Ltd., Queensway; and Paragon Art Automobiles, 23, Daryaganj; all of Delhi.

679 R.S., Shimoga—We have no book dealing with knitting of badminton guts.

683 I.C.W., Vellore—For sodium nitrate enquire of the following firms: Atlas Fertilisers Ltd., 4, Bankshall Street; Daven & Co., 11, Portuguese Church Street; Ewing & Co. Ltd., Olive Row; Imperial Chemical Industries (India) Ltd., Chowringhee Road; and [illegible]dar & Co. Ltd., 20, Netaji Subhas Road; all of Calcutta.

684 C.L.C., Muzaffarnagar—Chemicals required for mantle industry may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

685 R.D., Jhansi—Chemicals and colours may be had of Imperial Chemical Industries (India) Ltd., Chowringhee Road, Calcutta.

687 V.N.R., Berhampur—You may start a [illegible] with Rs. 10,000/ to Rs. 20,000/- as [illegible] capital. This business is lucrative and [illegible] same time has good prospect.

[illegible] R.M.P., Sunav—You may consult [illegible] of Soap published from this office, price Rs. 4/12/- including postage.

[illegible] A.K.B., Lucknow—Process of manufacturing boot polish will be found in Prosperous Industries published from this office, price Rs. 5/12/- including postage.

[illegible] Y.S.R., Jamnagar—All the formulas [illegible] require will appear in due course.

[illegible] K.V.P., [illegible]—For required dies enquire [illegible] Machineries Mnfg. Co., 22, R. G. Kar [illegible] Calcutta and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension Calcutta.

675 R.K.M., Nabadwip—Formulas of hair oil of all sorts will be found in Indian Perfumes, Essences and Hair Oils published from this office, price Rs. 5/12/- including postage.

677 D.I.L., Calcutta—We have no book containing classified list of chemicals consumed by cotton mills, jute mills, sugar mills, glass and enamel works, foundries, etc. You better write them direct for their requirement.

680 J.C., Jalalpore—Waxes may be had of Industrial General Products Ltd., 381, Hornby Road, Ismail Bldg., Fort, Bombay. For perfumery raw materials enquire of Abdullabhai Fidaali & Co., 122, Princess Street, Bombay-2; B.C. Patel & Co., 143 Princess Street, Bombay-2; Indo-Chemical & Trading Co., Post Box 2387, Bombay-2 and Perfumery Ingredients Company., 31, Mangaldas Road Market, Bombay. Tin boxes may be had of Bombay Tin Printers, 221-23, Thakurdwar Rd., Bombay-2; British India Metal Box Co., 111B, Tank Street, Sutri Mohalla, Two Tanks, Bombay-8 and Indian Metal Can Mnfg. Co Ltd., 13 Nobel Chambers, 116 Parshibazar St., Fort, Bombay-1. Collapsible tubes may be had of Tambawala Metal Manufacturing Works, 66/68 Narayan Dhuru Street, Bombay-3. Blocks may be had of Aboora Photo Engraving Co., 41-15, Medows Street, Fort Bombay and Excel Process Works, Excel House, Ghodbunder Road, Vile Parle, Bombay-24.

681 S.R., Bombay—Wire nail making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta and Bharat Industrial Corporation, 7, Mission Row Extension, Calcutta.

684 O.P.U., Dehra Dun Cantt.—For foreign plants and seeds write to Globe Nursery, College Street Market, Calcutta; National Nursery, 46, Ramdhone Mitter Lane, Calcutta; New Model Seed Farms, Barbarshah Bridge Bend Street, Srinagar, Kashmir; Empire Nursery and Garden, Lal Bagh Road, Bangalore City and Bhan Brothers Ltd., Srinagar Kashmir. For fertilizers enquire of Acme Fertiliser Works, "C" Block, Hide Shed, Kidderpore, Calcutta; Atlas Fertilizers Ltd., 4, Bankshall Street, Calcutta; Talukdar & Co. (Fertilisers), Ltd., 20 Netaji Subhas Road Calcutta and Ganeriwala Bros., Gorakhpur, U.P.

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Industr

MONTHLY MAGAZI

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ADVERTISEMENTS under this head of small announcements cost 1 An. per word, [illegible] payable by Postage Stamp or M.O. with order. No vouchers given.

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Bengal Leather Industries, 18/C St. James Square, Calcutta-12. Wanted Agents for "Santiniketan" Ladies Bags & Advertisement Novelties. 16-6 AA.

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Name Penholders, Pincushions, Silver Photoes, Chandralekha Agarbathis: Contact: Mysore Supplies. Mysore. 0-0 AA

Wanted Capable Agent for our Stomach Pills, Tablets Best Laxo-Purgative prospectus most attractive. New Oriental's Pharmaceuticals, 47, Nakhoda St., Bombay 3. 0-0 AA

Wanted Stockists and Agents for "Vir" Fountain Pen ink and other products. M/s. Sukha Nand Chhedalal Sikandarabad. U.P. 0-0 AA

"Wanted Dist: & Travelling agents for Silk Handkerchiefs, and Fountain Pens on attractive terms. Parties already in business should apply only. D. R. Puri & Son, East Patel Nagar, New Delhi 12. 0-0 AA

Wanted Really capable agents to push the sale of our highly concentrated [illegible] and Food Colours and Synthetic Almond Oil [illegible] for soaps, perfumery and other external application to the human body. For best terms apply Chiprang Chemical Corporation Regd. [illegible] Dist Jullundur E.P.R. 0-0 AA

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"Wanted Agents on Commission Basis For our General Merchandise Goods. Apply Surat Singh Jain Button Stores, Gandhi Market Sadar Bazar Delhi-6" (20-289 AA)

"Wanted experienced representatives in India & abroad, Ceylon & Africa for Highly concentrated Essence & Colours, etc., useable in Aerated Waters, Confectionery, Cakes, Biscuits etc., on attractive terms & commission basis. Apply:— Goldensun Manufacturing Co. 287, Victoria Garden Road, Byculla, Bombay-27." (36-290 AA)

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Sheffield Penknife (Can cut other Knives), [illegible], Harmoniums. Agents wanted, Raja Engineers, Gurmandi. Delhi. 12—68 AD.

Wanted Agents for Plastic Buttons on Commission basis. Apply: The Star Button Stores, 88, Khangrapatty Street, Calcutta-7. (17-283 AA)

Wanted Sound parties to push Sale of our [illegible] & Clasppins, Knives, Barbar Rasors & Scissors Samples 9. pieces. Rs. 18/- Diamond Industries 3, DevNagar K. B. New Delhi. (22-286 AA)

[illegible] by introducing silk fabrics in your locality. [illegible] Fabrics Mills, Ludhiana. (12-52 AA)

[illegible] (high class [illegible] & Stickal-white adhesive [illegible]. Wanted agents & Stockists. [illegible], 18, [illegible] Lane, Calcutta-9. (34-18 AA)

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Krishna Silicate & Glass Works, Ltd., 17, Radhabazar St., Calcutta. Manufacturers of Bottles and Phials of every description. (16-10 BC)

Bimal Bottle Stores Ltd., 130, Radhabazar St., Calcutta. Dealers & Importers of empty Bottles, Phials, Homoeo Phials, Glasswares & Corcks of all description. (20-8 BC)

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Lathes, Hand & Power Presses, [illegible] and Machineries for manufacturing [illegible] Contact:—Modgil Co., Engineers, [illegible] (Punjab). [illegible]

Bargain Sale—All makes of [illegible] Portable Good running Typewriters at [illegible] & upwards. Prices on request. [illegible] Typewriter Co., 6, Hastings Street, Calcutta [illegible]

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For Plastic, Soap, Lozenge, Biscuit, [illegible] Machine and Dies. Write to:—M/s. [illegible] Machinery Works, 25, Seven Tank [illegible] Calcutta 30. [illegible]

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For quality springs, enquire at British India Spring & Steel Co., 67B, Netaji Subhas Road, Calcutta 1. Telegram—Springman, Phone Bank 3154. 18-23 SR.

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Globe Typewriter Company, 19, Clive Row, Calcutta-1. Manufacturers & Dealers of all sorts of Typewriters Spare Parts Wholesale only. 18—57 M.A.

TEA & CONFECTIONS

New Bengal Tea Co., P221/1, Strand Bank Road, Calcutta. Wholesale dealers in tea. Telegran:—"BANGLACHA." (14-26 TC)

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Bengal Tin Box Mfg. Co., Ltd., 1, Jadu Mitter Lane, Calcutta—4. Phone B.B. 3090. Manufacturers of Printed Tin Containers of all descriptions. (14-38 TB)

WEARING APPARELS

If it is Superb Hosiery come to us. We distribute them wholesale, S. C. Lahiri & Co., 88, Cross Street, Calcutta. (19-28 WA)

INDUSTRY

A Monthly Magazine for Manufacturers and Businessmen.

Editor: K. N. BANERJEE.

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Contents for April Issue

April issue of Industry will contain many useful articles on commercial and industrial subjects such as Office Pastes and Gums; Manufacture of Alumina from Bauxite; Galvanising Steel Wire by Electric Process; Powdered Juice Concentrates; Business Management through Accounts, etc. in addition to the usual features such as Agricultural Tips: Scientific Researches and Inventions; Pharmaceutical Recipes; Recipes for Small Manufacturers; Formulas, Processes and Answers; Queries & Replies, etc.

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…E FOR MANUFACTURERS & BUSINESSMEN

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THE CENTRAL BUDGET

THE Budget for 1955-56 presented by Sree C.D. Desmuk to Parliament is rather disappointing. The total estimated revenue for 1955-56 is estimated at Rs. 468.76 crores and estimated expenditure is Rs. 498.93 crores The deficit of nearly Rs. 30 crores will be met to the tune of Rs. 21.70 crores through new taxation proposals, leaving a deficit of Rs. 8.47 crores.

Both income and expenditure on revenue account will rise considereably as compared with the revised figure for 1954-55, which amount to an estimated revenue of Rs. 451.08 crores and an estimated expenditure of Rs. 456.03 crores.

The revenue from Customs would be less by Rs. 15 crores, while Union Excise Duties were to go up by Rs. 19.8 crores owing largely to replacement of imports of petrol, kerosene and lubricants by indigenous production. Income-tax would be at about the same level as in the current year. Profits from the Reserve Bank would show an increase of Rs. 2½ crores owing to the increased yield on Treasury Bills held by the Issue Department. While no credit was being taken for the repayment of the Partition Debt by Pakistan, the estimates allowed for a transfer to revenue of Rs. 8 crores from the accumulated profits on the sale of imported sugar.

The Defence expenditure in the coming year was placed at Rs. [illegible] crores, and increase of Rs. 4.66 crores over the Revised Estimate for the current year The increase was mainly due to the normal expansion programme of the Navy and Air Force and also to the new pensionary concessions.

The Finance Minister pointed out, "While in present condition it is not realistic to expect any reduction in the strengths of the Defence Forces, we are trying to effect as many economies as possible by better conservation of staff, reduction in scale of consumption and avoidance of wastes. The drive for economy has been and is being pursued with vigour". Considerable progress

was also being made in the production in India of stores required by the Defence Services with the ultimate aim to achieve self-sufficiency in as wide a field as possible.

Civil expenditure next year was expected to be Rs. 38.19 crores more. The bulk of the increase represented larger allotments for development expenditure which was inevitable in the final year of the Plan. The expenditure on nation building and development services showed an increase of Rs. 20.01 crores. In addition, there was an increase of Rs. 4.44 crores on Community Development Projects and National Extension Services; Rs. 2.41 crores in grants to Part "C" States with legislature for financing their development schemes; Rs. 81 lakhs in grants for the development of scheduled tribes and scheduled areas; Rs. 50 lakhs in grants for primary education and Rs. 1.1 crores for social walfare and welfare of backward classes.

A sum of Rs. 3 crores had also been provided as the first instalment for the write-off of the trading losses erpected on the disposal of the eristing food stocks, mostly rice, the total losses being estimated as Rs. 45 crores. Among other increases, Rs. 1.46 crores were for the expansion of administrative and development services in the North-East Frontier and Rs. 1.27 crores for Civil Works.

The overall deficit for the current year was now estimated at Rs. 208 crores as against Rs. 239 crores originally anticipated.

Following larger provision for development expenditure, the Minister estimated for the coming year an overall deficit of Rs. 340 crores. This sizeable budgetary deficit, he said, did not carry any threat of serious inflationary pressures. The production potential of the economy was steadily increasing and the various economic indicators suggested that the country could go ahead more boldly.

The economic conditions had recorded considerable progress during 1954. Both agricultural and industrial production had increased and in some commodities the Five Year Plan targets exceeded. Food controls were practically removed and pace of industrial development was encouraging.

Reviewing the economic situation, the Finance Minister said that the year 1954 might, in a sense, be regarded as the end of the post-war period of transition. The substantial increase in food production, the improvement in the supply position and other directions and the disappearance of inflationary conditions represented the end of war-time stresses and strains. The process of decontrol which commenced in 1952 was more or less completed in 1954; and free interplay of demand and supply forces was resumed over a wide field. From now on, he said, unless very marked deterioration took place in the international situation or a natural calamity like the failure or maldistribution of the monsoon occurred in a big way the determining factor in the economic situation, would be the rate of planned economic development in the country.

The main features brought out in the Finance Minister's review were increase in agricultural and industrial production, the downward adjustment of prices and adoption of measures for price support for wheat and coarse grains in certain areas, considerable relaxation of controls and increasing tempo of industrial development in the country.

[illegible] Production of foodgrains in 1953-54 amounting to 66 million tons exceeded the Five Year Plan target by about 4.4 million tons, and that of oilseeds at ·6 million tons by about 100,000 tons. The production of cotton at 3.9 million had very nearly reached the Plan target, Jute production mainly on account of violent fluctuations in prices, stood about 4.5% lower than the figure recorded for 1950-51.

The tempo of industrial development was also encouraging. A number of new industrial undertakings were started during the year and several new lines of production taken up such as all gear head lathes, fuel injection equipment stable fibre etc. Two important steps were taken with the object of assisting rapid industrialization of the country. The first was the setting up of the Government owned National Industrial Development Corporation and the second was the flotation with the co-operation and assistance of the Govenrment and the good offices of the International Bank for Reconstruction and Development of the Industrial Credit and Investment [illegible] subscribed by the [illegible] U.K. and the U.S.A.

In the sphere of small-scale [illegible] cottage industries, several measures [illegible] step up production were taken. A team of experts, sponsored by the Ford Foundation, made certain recommendations [illegible] on the basis of these, four regional institutes of technology for small industries, a Marketing Service Corporation and a Small Industries Corporation have been set up.

In the sphere of State enterprise, the industries which went into production during the year were the Hindustan Cable Factory and the Machine Tool Factory. Penicillin and D.D.T. factories were due to start production soon. [illegible] takin at Rourkela. Orissa, was also in progress and recently an agreement was signed with the U.S.S.R. for the installation of an additional steel plant with a capacity of 750,000 tons of finished steel. The Sindri Fertilizer Factory had almost reached its rated capacity and undertakings like Chittaranjan and the India Telephones recorded marked improvement.

PROGRESS OF PAPER INDUSTRY IN INDIA

The latest position regarding the progress of the paper industry in India is indicated by a survey undertaken by Mr. Sundell, a paper and pulp expert of the Food and Agriculture Organisation. The survey discloses that the output of paper has registered an increase of nearly 50,000 tons during the last four years. Thus, the output in 1954 amounted to 155,328 tons, as against 108,907 tons in 1950. In the past two or three years some existing units have implemented their expansion programmes, while, in certain areas, two or three new units have also been established. There were 17 units by the end of 1950. Today there are, it is stated, 21 units in the production of paper. Seven of them, according to the survey, are in the South, five in Bombay and Madhya Pradesh, three in the Punjab and U.P., and six in West Bengal, Bihar and Orissa. The rated capacity of these units is expected to be 287,110 tons by 1960-61.

Among with the increase in the rated capacity, there has also been an increase in consumption. The per capita consumption of paper in India has, it is stated, risen by 50 per cent. during the last five years, and the total demand is estimated to go up to 200,000 tons per year by 1956 and to 481,000 tons by 1961-62. It is expected that, by 1956, the actual production of paper and paper board will adequately meet the requirements. The country, however, will have to depend upon foreign imports in regard to certain special types of paper in limited quantities to meet the needs of certain consuming industries and special class of consumers. Mr. Sundeli observes that this small import is not likely to hamper indigenous production and that it will, on the contrary, stimulate indigenous producers to improve the quality of their products.

The industry has also the advantage of getting its requirements of raw materials from indigenous sources. Thus bamboo, sabai grass, bagasse, rags, wastepaper miscellaneous fibres are available within the country. In pre-war years, the industry depended on imports for a considerable quantity of wood-pulp. But, in recent years, imports of raw materials are confined only to a small quantity required for the production of specialised paper and for viscose conversion.

The capital invested in the paper industry is estimated at Rs. 21.72 crores. An additional investment of Rs. 14.3 crores is envisaged under the new schemes which are being implemented and for the expansion of existing units. With a further investment of Rs. 2.2 crores, the industry would have the required capacity to fulfil the target of 370,000 tons in 1960-61.

The paper industry at present employs over 26,000 people. 2,100 of whom are technical personnel. With the planned development of the industry, the employment is expected to go up to 54,000 by 1960-61 of which about 4,000 will be technical persons.

SMALL ENGINEERING INDUSTRIES IN HOWRAH

A comprehensive scheme for the development of small-scale engineering industries in Howrah districts under the aegis of a central organization has been put into operation by the State Government from January 1 last.

[illegible] West Bengal Assembly that the Government of India had agreed to bear a major share of the financial commitment of Rs 55 lakhs to be needed for the scheme.

The Government, he added, would pay 75 per cent of the non-recurring expenditure for the first year of implementation of the scheme by way of outright grant. Half of the recurring expenditure for the first year would also be met by them in the shape of outright grant. The Government would also provide 66-⅔ per cent of the working capital as loan-bearing interest at the rate of 3½ per cent repayable in 10 years. For re-equipping the units 66⅔ per cent of the amount of loan was proposed to be advanced on the same terms. The Government of India had also given an informal assurance that they would meet expenditure on the same basis as in the first year for succeeding years also.

The Deputy Minister, who was replying to a question of Sri Biren Banerjee, said that under the scheme the central organization would be equipped with a central workshop, a marketing organisation and a technical development section. The monetary resources of these engineering units would also be strengthened by means of State financial assistance wherever needed.

According to a recent survey conducted by the Bureau of Industrial Statistics, there are about 762 small engineering units in Howrah employing a total of 6,800 workers.

PILOT PLANT FOR PRODUCING IRON WITHOUT COKING COAL

The establishment of a mining research station at Dhanbad, an Indus- [illegible]

[illegible] major proposals [illegible] of the Board and the [illegible] the Council of Scientific [illegible] Research held at Delhi.

A five-year programme of [illegible] India for the development of [illegible] turbines suited to Indian [illegible] adopted. The plan, which was [illegible] by a special committee presided [illegible] Mr. J. R. D. Tata and assisted by [illegible] British expert, Prof. O. A. Saunders [illegible] the London University, includes the setting up of a research centre at the Indian Institute of Science, Bangalore for [illegible] ing gas turbines to Indian requirements, needs and fuels.

EXPORT POSSIBILITIES OF CUTTLE BONES IN THE UNITED KINGDOM

The Minister (Commercial) to the High Commissioner of India, London, has reported that there is a good market in the United Kingdom, for cuttle fish bones which are in great demand in the cage birds' trade and, to a lesser degree, in the jewellery and coach building trades. The size of the bones for the case birds' trade is about 8 inches; they can be smaller for the other trades. It is, however, absolutely essential that deliveries should be free from any sort of contamination with fish-meal or any other substance. Large importers in the United Kingdom are understood to import usually on their own account, but they are liekely to give a more favourable consideration to a shipment on a consignment basis. A list of the leading firms, stated to be interested in the import of cuttle fish bones into the United Kingdom, has been received in the Department of Commercial Intelligence and Statistics, Calcutta. Firms [illegible]

[illegible] in the [illegible] may apply for the said list to the Director of Commercial Intelligence and Statistics, 1, Council House Street, Calcutta-1, with their bank and trade references.

EXPORT OF COTTON WASTE

Export of cotton waste soft other than slivers, roving ends and bondas, will continue to be licensed freely for export within an overall ceiling upon 30th June 1955. Licensing will be done by endorsement on shipping bills.

A quota of 10,000 bales (35,700 cwts.) of cotton waste of restricted varieties, viz., sliver waste, roving ends and bondas, has also been fixed for export during the period January-June, 1955. Export licences will be issued to established shippers who have already enlisted themselves as such and were recipients of export licences for these wastes during July-December, 1954.

AN ELECTRICAL EQUIPMENT FACTORY

The Government of India has decided to set up State-owned heavy electrical equipment factory at a cost of about Rs. 20 crores. This is in accordance with the recommendations of an expert committee appointed by the Government. The State factory will produce transformers of 33 kw. and above, hydraulic turbines and generators, for diesel sets, and tractor motors for railways. The details of the projects will be finalised by the Government in collaborartion with foreign firms.

[illegible] TO TYRE INFLATORS

The Government of India has, in accordance with the main recommendation of the Tariff Commission, decided that a protective duty of 45 per cent. ad valorem should be levied on hand inflators with connections adapted as accessories of motor vehicles with effect from 14th February, 1955. The Commission has recommended that the protective duty should be in force till the end of 1957. The Government also proposes to examine by the Commission for affording additional assistant to the industry.

EXPORT OF OIL CAKES

The Government of India has decided to permit the export of 25,000 tons of various types of oilcakes outside India for shipment up to the end of April, 1955. The exports will be made up of cottonseed oilcake 10,000 tons, linseed oilcake 5,000 tons, kardiseed oilcake and nigerseed oilcake 5,000 tons, and oilcakes other tan tobacco seed oilcake and copra oilcake 5,000 tons. An export duty of Rs. 100 per ton on decorticated cottonseed oilcake and Rs. 50 per ton on all other oilcakes, including undecorticated cottonseed oilcake and excluding groundnut, copra, mowha, tobaccoseed and neemseed oilcakes.

STANDARD FOR MERCERISED COTTON FABRIC FOR GLIDER

An Indian standard specification for mercerised cotton fabric for gliders has just been issued by the Indian Standards Institution. The standard lays down requirements for mercerised cotton fabric for gliders and prescribes constructional details and other particulars of the same intended for use in covering gliders with wing loading of 8 lbs. per sq. ft. or less and with a maximum safe speed of 135 m.p.m. It is the third of a series of Indian standards on mercerised cotton fabric for gliders and aircraft now under preparation by the I.S.I. The first standard

[illegible]

[illegible] that is I.S. 914-1954 mercerised cotton fabric Grade 1, for aircraft was published some time back, and the second standard in series dealing with mercerised cotton fabric, Grade 2, for aircraft is under preparation. In formulating this standard the feasibility of manufacture and trade practice followed in the country have been taken into consideration. Hence the standard has been based, to a certain extent, on the tentative specification for mercerised cotton glider fabric, issued by the Civil Aviation Department of the Government of India.

DEVELOPMENT IN INDIA BY U.K. STEEL FIRM

References to development by the company in India and other Commonwealth countries were made by Mr. A. G. Stewart, Chairman of Stewart and Lloyds Ltd., at the recent annual general meeting of the firm in London. He said that, in India, in conjunction with the Tata Iron and Steel Company, Ltd., a continuous-weld tube-making plant was being erected at Jamshedpur. This plant would be owned and operated by the Indian Tube Company (1953) Ltd., in which Stewart and Lloyds had a 40 per cent. interest and Tatas the remaining 60 per cent. The plant was expected to come into operation towards the end of 1955.

Mr. Stewart said the Indian Tube Company had decided to add an electric-weld tube plant for the manufacture of boiler tubes and other high-grade categories. He was confident that formal approval from the Government of India to erect this plant would shortly be obtained. Arrangements have been made to commence construction, and the scheme should be completed early in 1957. The Chairman added that Stewart and Lloyds would continue to export to [illegible] India categories of tubing not made by the Indian Tube Company.

THE FIRST NEWSPRINT FACTORY

The first newsprint factory of India, the NEPA Mills at Chandni, Madhya Pradesh, has made trial production of newsprint with imported chemical pulp. The management proposes to send to important newspaper concerns sample rolls, enough for one day's consumption with a view to getting their opinion on the quality of the production. The mill, when it goes into full production—100 tons of newsprint daily—will be able to meet about onethird of India's present annual consumption of newsprint.

BURMAH-SHELL REFINERY GOES INTO PRODUCTION

The crude distillation unit, the second biggest unit is the Rs. 30-crore Burmah-Shell Refinery and the main hub of refining operations, went on stream on 30th January, one year ahead of schedule. The first critical moments of the start-up operations in the refinery are now past and initial supplies of the product have begun to flow from the Refinery to the marketing installations. The crude oil intake capacity of the plant in the initial stages will be about 5,000 tons per day. The unit will be producing such petroleum products as raw kerosene for further refining, gasoline for motor spirit, high speed diesel oil, light diesel oil and furnace oil for India's immediate needs. The total output of the two Bombay Refineries, when in full production, will be about 773 million gallons per annum. The Burmah-Shell Refinery alone will produce about 475 million gallons per annum, which is more than 60 per cent. of the refining capacity of the two Bombay refineries, and over 50 per cent. of the total estimated refining capacity of all the three new Refineries which by 1957 are [illegible]

expected to be on full stream. The three refineries, together with India's oldest refinery at Digboi, Assam will meet about 90 per cent. of India's requirements of petroleum products. It will be remembered that the initial planning and investigation work for the refinery began in 1952, and, despite early difficulties, the 450-acre site, consisting of waste and arable land, was acquired in 1953. After clearing and levelling of the site, construction work on the distillation unit was taken in hand in April of the same year, and, by the end of 1954, nearly 20 months later, the major part of the construction work for the whole project was completed.

TEXTILE OUTPUT AND EXPORTS

Mill production of cotton yarn and cloth would appear to have suffered a slight setback during the month of January, 1955. The provisional estimate of yarn output in that month is, for instance, placed lower at 135 million lbs., as against 143 million lbs. in December, 1954. The figure is, however, higher than that for the corresponding month last year by 3 million lbs. Similarly, the production of cloth is estimated lower at 431 million yards, which compares very unfavourably with 451 million yards in the previous month, but is very much higher than 397 million yards produced in January, 1954.

The export trade in mill-made cotton piecegoods also suffered a contraction during the month under review. The quantity of cloth actually passed for shipment from the port of Bombay amounted to 63.91 million yards, as against 82.19 million yards a month before. The fall in exports was shared by all the varieties. Thus, exports of coarse cloth aggregated 9.52 million yards, as against 12.03 million yards. Medium cloth exports decreased from 61.60 million yards to 51.19 million yards. Exports of fine and superfine counts were lower at 2.29 million yards and 910,000 yards, as against 6.32 million yards and 2.24 million yards, respectively.

TELEPHONE CABLE FACTORY TO USE INDIGENOUS LEAD

The Hindustan Cable Factory, which went into production in September last year, will shortly start using indigenous antimonial lead, one of the principal raw materials of telephone cable. The Cable Factory has been depending on imports to meet its requirements of antimonial lead, for Indian products have so far failed to come up to specifications. But, as a result of concerted efforts made by the Hindustan Cables Limited, the Director-General of Supplies and Disposals and the manufacturing firm, antimonial lead of the required specification is, it is stated, now being produced in India. Consequently, the Hindustan Cables has decided to procure from indigenous sources the entire requirements of antimonial lead for manufacture of cable in the near future. The Hindustan Cable Factory, situated in the industrial belt of the Damodar Valley at Rupnarainpur, near Chittaranjan, is, it may be noted, designed to produce about 500 miles of telephone cables on single shift operation.

POULTRY AS A SECONDARY INDUSTRY

THE word poultry means the varieties of domesticated birds, that produce eggs and meat for human consumption; and it then not only includes all the different varieties of hens but ducks, geese, turkeys and pigeons too.

In a vast country like India where two-thirds of the population makes its living from farming, it is absolutely essential to have some sort of secondary industry as a subsidiary one to farming, so as to enable them to utilize their unoccupied time and unused material in producing something more to make comfortable living. One can think of many such secondary industries for instance, making yarn weaving rope making, and so on, but none of the above would be more profitable and a more fitting adjunct to the farming profession than that of keeping and managing a small poultry farm.

ADVANTAGES OF POULTRY AS A SUBSIDIARY INDUSTRY

The reasons for it as a secondary industry to the farmer are :—

First:—It requires a very small investment to make a successful start. A dozen or two high laying birds with ordinary meat and comfortable house and yard would cost him not more than Rs. 100/-.

Second :— The cost of rearing and maintenance would be practically a small amount as the farmer would be utilizing his surplus unclaimed grains from godowns, threshing yard and the field-waste. Under strict city conditions even the maintenance of a hen including every thing works to, three pies a day

Third :— The labour is very [illegible] and of a nature that all the members of the family, men, women, children, young or old, infirm or shirking from hard manual labour, can take part in it with ease and interest. Women or girls who often remain at home would do best this job, as they have the inherent trend to look after little details and observe cleanliness—the first two key-notes in successful poultry keeping. One person can easily manage two dozen fowls.

Fourth:—It starts giving returns on the very day and every day throughout the year. Steady income for every day means profitable occupation and credit with neighbours. Two dozen hens managed by one person would give one dozen eggs a day worth Re 1|-.

Fifth:—It is an aid to crop returns in a way that the poultry manure adds to soil fertility, that birds pick up all weed seeds, catch and eat all the injurious insect pests found in the field on the crop and animals, even the scorpions, millipedes and young snakes which are dreaded enemies of the farmer are tackled and eaten by them.

Sixth:—It is an industry the products of which are very little affected by the competition and slum of the distant and foreign markets. Even if the produce is unsold at any time, it can be economically utilized in the house-hold for bringing up bonnie babies and robust parents.

Seventh:—It is a very healthful, interesting and invigorating occupation.

It has only two disadvantages and one that it requires constant attendance, the other is the often unwarranted fear expressed of having an outbreak of con-

affected thereby. This latter is wholly due, to inattendance and negligent management.

PRESENT NEGLECTED CONDITION OF STOCK REARING.

As it is now, the fowls seem to have been maintained as an unaccounted incident, the birds living on any accidental food or refuse as they picked up in the free range, drinking dirty water they got, having no protection from the fatal attacks of their enemies except during night when they are shut up in an insanitary mud-made dungeons; and up to the present time even, the breeding has been very indiscriminate one, proper feeding has been neglected and no attention has been given during their ill-health. The only fowl that seems to have received any care was the game bird Asil for its exciting fighting qualities. The present Indian fowl is nondescript, miserable ill-looking and undersized bird; it weighs 1 to 1½ lbs. only, starts laying at the age of seven months and lays sixty eggs a year of unattractive appearance and tiny size 1 to 1½ oz. in weight; while its original migrated sisters of western countries under systematic management, now weigh 4½–7 lbs.: start laying after 5 months and lay yearly 175-240 eggs of very attractive appearance, and huge size of 2¼ to 2¾ ozs. each.

PROGRESS OF POULTRY INDUSTRY IN OTHER COUNTRIES.

In other countries the poultry industry as a subsidiary or specialized has progressed to an unimaginable extent. The statistics of United States of America shew that there has been 800 crores of rupees worth poultry produce, more than their wheat production and that little country like Denmark other words 1/6th of cultivable area of our Bombay Presidency, produces annually 4½ crores Rs. worth poultry produce and exports eggs worth more than 3½ crores of Rupees while this very tiny country sixty years ago exported 27000 Rs. worth poultry produce. Even the backward country like China exports nearly 4 crores of rupees worth eggs in a dry and liquid form.

The underlying cause of such big national income of these countries is that the industry is conducted with proper knowledge, practice and organization as a secondary occupation subsidiary to agriculture.

FACTORS CONDUCIVE TO SUCCESS.

Those factors can be summed upon in three cardinal rules:—

First:—Training in the science and practice of poultry culture including breeding on right lines, rearing and feeding on rational basis, comfortable housing and proper care during their illness.

Such training facilities are available at the Government Central Poultry Breeding station attached to the Agricultural College Dairy, Poona.

Second:—Making a start with best foundation stock of high capacity laying hens and breeding cocks from well acclimatised layers giving not less than 150 eggs a year and above 2 ozs in weight each. Such birds would not cost more than Rs. 5 per pullet and can be obtained from the Government Central Poultry Breeding Station at Poona.

Third:—Improved ways of marketing from the producer to consumer are essential for this industry also. These can easily be brought about by joint co-operative efforts through the help of Co-operative Department.

FOR THE PLAINS.

Vegetables:—Little can be done now in the cultivation of vegetables.

Well water Asparagus.

Gather seed of Onion and Saisify.

Put yams in the ground, and construct trellis-work for them to trail upon.

Fruits:—Water Melons unremittingly. Keep Strawberry plants watered while the hot season lasts.

Ornamental Plants:—The leaves of Gladilous and some other bulbous plants will be dying down. The pots containing them should be removed to some dry place where they may remain till the time for re-potting comes round again.

Achimenes, which at this time will be starting into growth should be potted and well watered as soon as they appear above ground.

FOR THE HILLS.

Vegetables:—This is also a busy month. Successive sowings should be copiously.

Fruits:—Strawberries will now be ripening, and should be watered copiously or the fruit will be small, and watery in taste. Water other fruit sufficiently.

Fowers:—Roses, Geraniums, Fuchsias will now be making growth, and should be kept well supplied with water. An occasional application of liquid manure will have a good effect especially on Roses in pots and the Dehlia should now be looked to. They should be carefully turned out of their old pots, and planted in fresh, rich—the richer the better. Tubers of Saladium Alocesias, Gesneras and Gloxinias should now be planted in spots together with tuberous rooted Begonias. Cuttings of Roses, Geranium, Fuchsias, Begonias, etc., if put down now will strike very readily.

Manufacture Of Lithographic Ink And Pencils

LITHOGRAPHERS require special inks or pencils, according to the particular method of procedure. If the stone is polished the drawing is executed in lithographic ink on it with a pen or brush. When the stone is then treated with a dilute acid the ink protects the parts it covers, which therefore become raised above the etched part of the stone and the sheets can then be printed from it. When however, the manuscript is to be reproduced by lithographic the manuscript is writing downwards, on the smooth stones and the ink is transferred to the stone by pressure. The acid is then used as before.

When the lithography has to be done on a rough stone, pencils and solid ink are employed.

The inks and pencils used for lithography must always contain acid-resisting bodies. and must be capable of giving a number of impressions. Such bodies are fat, resin, and wax when converted into a soap.

FORMULAS OF LITHOGRAPHIC INK

I

Gum lac	100	parts.
Mastic	30	"
Rosin	10	"
Tallow soap	70	"
Soot	32	"
Water	140	"

Take one copper boiler fitted with a lid and a copper pan with a spout. First melt together all the ingredients, except the wax, in the pan, and get a uniform mixture by thorough stirring. Then heat the wax in the larger vessel until it can be ignited. At this stage pour the contents of the pan into this burning wax with stirring. As soon as all the ingredients are in the boiler, the wax fire is put out by putting on the lid, and the heat is moderated till the mass only keeps in fusion. The mass is then ladled out into metal moulds to the desired shape.

This ink is written with after rubbing up with warm water. Any ink rubbed up which is to be left overnight should be covered up to keep it moist, for if it has to be rubbed up again it will very likely form lumps which will spoil the work, more particularly if a brush is used.

It has been recommended to dissolve the ink in hot water and bottle it. Although this saves constant rubbing up, the practice is not good, as the rubbing up each time gives a more uniform and reliable writing fluid.

II.

Shellac	30	parts.
Mastic	6	"
Corbonate of potash	6	"
Hard tallow soap	6	"
Soot	2	"

Melt the soap with the shellac and the mastic and stir the carbonate and the soot into the fused mass. As soon as the mixture is uniform it is cast in the moulds.

III.

Wax	18	parts.
Tallow soap	18	"
Shellac	14	"
Rosin	6	"

Tallow	10	parts.
India-rubber	2	"
Turpentine oil	5	"
Lampblack	6	"

Fuse the first five ingredients together, and heat till the mass begins to bubble. Then stir in the lampblack and also the india-rubber, previously dissolved in the oil of turpentine. When the smell of the turpentine has nearly disappeared cast the mass into sticks.

IV.

Wax	20	parts.
Tallow	10	"
Shellac	20	"
Soap	20	"
Carbonate of soda	30	"
Soot	10	"

Fuse all together in a copper pan at strong heat, and stir vigorously.

V.

Wax	12	parts.
Tallow	12	"
Hard Tallow Soap	12	"
Shellac	24	"
Mastic	16	"
Venice turpentine	2	"
Lampblack	22	"

Heat the venice turpentine, and add to to it the shellac, the mastic (both finely powdered), the tallow, the wax, and the soap in the order mentioned. Finally mix in the lampblack intimately. The tough mass produced on cooling is rolled out and cut up and shaped.

[illegible]

This is used for drawing on the [illegible]. It must be dense enough to take a [illegible] point without breaking like a good [illegible] pencil, and give a uniform stroke [illegible] light pressure.

TYPICAL RECIPES

A couple of typical recipes is given below:—

I.

Wax	30	parts.
Tallow	25	
Soap	20	
Lampblack	6	

Fuse all together, and heat till the mass can be set fire to. It is then allowed to burn for a time which, however, requires some experience to judge it. The condition of the mass can, however, be judged of at any time by extinguishing it by putting the cover on the boiler, and then making a stick of the mixture and trying how it will write. If the stick will not bear a sharp point, having some elasticity and writing a uniform block line, the mass in the boiler must be set fire to again, and again tested a few minutes later. The finished mass is rolled out on a hard surface, and made into pencils the thickness of a goose quill and about [illegible] inches long.

II.

Tallow	100	parts.
Soap	85	"
Shellac	70	"
Mastic	10	"
Lampblack	10	"

Fuse together and ignite, and proceed altogether as directed under recipe I.

LITHOGRAPHIC COPYING INK

These are intended for transferring a writing or drawing to the stone, so that the latter can be printed from directly it has been etched. Here we have a means of securing a number of copies, which is very important for circulars, letters, plans, etc. But certain difficulties attend the preparation of these inks, for it is necessary to prepare a liquid which besides possessing the properties of an ordinary ink, will cling fast to the stone, and gives copies for a considerable time. The paper used may be usual paper, provided it is not too rough, for common work such as a circular, but if fine work is necessary, as in preparing copies of a pen-and-ink drawing or of an architect's plan, prepared paper only is usable. A method of preparing such a paper is as follows.

PREPARATION OF GLUE PAPER

By following strictly the recipe about to be given the finest line or point can be faultlessly reproduced in the copies. The stone can be etched immediately the transfer has been made, and many thousands of good copies can be printed off.

A fine, strong, unsized printing paper is spread out on a smooth board, and poured over first with a 10 per cent solution of gelatine. The board is then tilted and the gelatine run off, and a 5 per cent solution of tannin is next poured on. The paper is again draineed and dried. The two [illegible] and the drying are then repeated a second or a third time, and the paper [illegible] calendered. This paper will not [illegible] transfer as above stated the finest [illegible] drawing, but will also take the [illegible] a copper or steel plate, [illegible] them to the stone.

When the drawing or [illegible] been laid on the stone the [illegible] forcibly pressed together [illegible] The paper is then carefully taken off. The repetition of the pressure is made necessary by the fact that the stone takes an appreciable time to take the ink so strongly that it will not be affected by the etching.

BEST LITHOGRAPHIC COPYING INK

Wax	110	parts
Tallow	30	"
Soap	110	"
Shellac	50	"
Mastic	40	"
Rosin	10	"
Soot	30	"

Fuse all together in an iron vessel and then raise the temperature until disagreeable vapours are largely produced. Then cast the mass into moulds or roll into sticks.

DRAWING COPYING INKS

To prepare this ink, first make the ground mass and then produce the actual ink.

GROUND MASS

Wax	70	parts.
Tallow	75	"
Soap	60	"
Copal	45	"
Shellac	70	"
Mastic	70	"
Pitch	10	"
Linseed oil	10	"
Sulphur powder	10	"

First of all fuse the copal with the

[illegible]

[illegible] Then add the soap, then the [illegible], then the wax, and then the other [illegible]. Then heat the mixture strongly and set fire to. During the combustion sprinkle the sulphur on to the mass with continual stiring. The combustion must be maintained until about three-quarters of the mass has been burnt away. Then put out the fire by covering the vessel with the lid.

COPYING INK NO. 1

Ground mass	12	parts.
Distilled water	100	"
Indigo Carmine	5	"

Boil the ground mass with the matter until the volume is reduced to one-half. Then pour off the clear brown liquor and dissolve in it the indigo-carmine. Then bottle the ink.

If the ground mass has not been burnt long enough the ink will not copy well, as [illegible] the combustion [illegible] prolonged, the ink will [illegible] properly to the stone. It must [illegible] remarked that when the writing [illegible] ferred to the stone the back of the [illegible] must be well damped to facilitate the [illegible] fer of the ink from it to the stone.

COPYING INK NO. 2

Wax	200 [illegible]
Soap	60
Tallow	32
Shellac	16
Pitch	8
Carbon Black	40

Fuse all the ingredients together [illegible] stir to a uniform mixture, which is gradually heated till it fumes strongly. As soon as the mass catches the fire, cover the vessel with the lid to put it out. Then cast the finished ink into sticks. For use rub it up with hot water.

Salting Of Butter

BUTTER is salted to increase its flavour and to promote keeping quality.

AMOUNT OF SALT TO USE

The usual amount of salt added to butter is 3 to 4 pounds per 100 pounds of fat. This leaves 2 to 3 per cent of salt in the finished butter. Three per cent of salt is considered by most buttermakers to be sufficient for flavour demands of any market. It has also been proved experimentally that greater amounts will seriously reduce keeping quality. In fact, 2.5 per cent salt is a better limit for butter of any quality. Butter made from average cream will usually store better if it has about 2 per cent of salt, whereas butter from fine cream will store well with 2.5 per cent of salt. Second-grade butter often stores better when fresh if it contains no salt at all. A medium salt content accentuates flavours, and second-grade butter may score less when salted. It is sold unsalted only to special markets. Such unsalted butter is usually made from ripened cream to augment its flavour.

An additional consideration in ripening unsalted butter is the influence of a higher acid content on its keeping quality. In the absence of the preservative properties of salt, ripening of cream is practised (0.40 to0.45 per cent) to inhibit growth of certain putrefactive types of organisms.

METHODS OF SALTING

The salt is usually placed in trenched [illegible], being distributed evenly from end to end of the churn. The trench is closed and the working started. The salt may be [illegible] dry or it may be made into a salt [illegible] before being trenched in. The [illegible] method starts the solution of the salt and may facilitate proper incorporation of moisture, whereas dry salt would at first tend to withdraw moisture from the butter. This method is often used during the fall and winter butterfat is more firm and delayed moisture incorporation might result with dry salting. Water used for the salt mash must be deducted from the total amount of water calculated to be added to the churn for moisture control.

Some buttermakers work the salt with the butter a few revolutions before adding water. This is likely to secure added benefits from trenching, and less salt may be wasted by entering the wood of the churn as brine. When butter is salted at the rate of 3 pounds of salt to 100 pounds of butterfat, the butter may contain theoretically 2.4 pounds per 100 pounds of finished butter.

$3 \div 100 = 3$ per cent of salt on fat basis

$3 \div 125 = 2.4$ per cent of salt on butter basis

A pound or more of salt will soak into the wood of the churn, and, when some water remains in the churn after working, the salt content of the butter may be 2.2 to 2.3 per cent. This is considered enough, particularly from the standpoint of storage.

There are other factors also in this apparent loss of salt between the amount added and the amount recovered in the butter. Salt may be stored in a damp place. A pound of such salt would cause a greater apparent loss than dry salt. Slight impurities in salt also cause some additional apparent loss.

There is some apparent loss of salt in the all-metal churn.

of salt be placed evenly in both doors of a two-door churn. Experiments disclosed considerable difference in the salt content of butter when the amount of salt was distributed by guess as compared with weighing two equal batches. In the newer single-door, short-barreled churn, the danger is not so great. The importance of this point, however, should not be overlooked.

Salt added to butter in rollerless churns may or may not be embedded in the butter. The makers of some of these churns state that trenching is not necessary. It is possible that trenching may cause slightly less waste of salt. It would seem desireable to trench if salt mash is used. The all-metal churn has a special opening near the top. This is used to transfer the cream to the churn, to add colour, and to add salt. The door of the churn remains closed. This is an advantage where an insect menace exists.

SALT IN RELATION TO WATER IN BUTTER

Experiments have demonstrated that pure fat is not a salt-dissolving substance. Owing to this fact, the only salt-dissolving substance in butter is water. As water will hold only a certain amount of salt in solution, it becomes evident that the amount of salt which can be properly incorporated in butter depends upon the amount of moisture present.

The amount of salt which water will hold in solution at different temperatures varies somewhat according to different investigators. According to Gerlach water will dissolve 35.94 per cent of salt at 58°F. This is approximately the temperature at which salt is worked into butter. Theoretically butter containing 15 per cent of water should be able to dissolve 5.4 per cent of salt properly. Butter containing 13 per cent of water should be able to dissolve 4.66 per cent of salt properly, and butter containing 10 per cent properly 3.6 per cent of salt, etc. According to experiments conducted at the Iowa Experiment Station the maximum percentage of pure salt (NaCl) that could be properly dissolved in water of butter containing 16.92 per cent of moisture when worked 18 revolutions at intervals during two hours, was 16.57. When butter was worked the same number of revolutions at intervals, and the salt was allowed to dissolve only one hour, the amount of pure salt (NaCl) that was dissolve in the water of the butter containing 11.58 per cent moisture was 14.09 per cent. This undoubtedly will vary with different brands of salt.

It will thus be seen that the property of water to take up salt is seemingly lessened when the water is present in a state of minute division, as it is in butter.

From the foregoing it is evident that where butter contains a high percentage of salt, the salt may not be thoroughly dissolved. Undissolved salt causes gritty butter.

Mottles or uneven colour is also caused by the presence of undissolved salt. Water tends to migrate to points of greatest salt concentration. The presence of more brine near undissolved salt produces sarker spots or mottles.

KIND AND CONDITION OF SALT

Salt for butter should be fine and readily soluble, so thaat it will be completely dissolved and incorporated when the working of the butter is completed. But fineness alone does not determine solubility; some salts that do not seem very fine are quite readily soluble, because the crystals are somewhat flat and dissolve quickly. Again, good dairy salt is white and clean in appearance. When it is dissolved in a cylinder of water there should be no settlings and nothing left floating on the surface of the water.

EFFECT OF SALT ON KEEPING QUALITY

Butter for storage should not have the extremes of salt content which may be used in other butter. In general, it appears that a salt content of 15 to 25 per cent is a very suitable range for storage butter. Salt has a wellknown preservative effect and inhibits the growth of micro-organisms. It is therefore beneficial from this standpoint. On the contrary, we have sufficient experimental work which shows that higher percentage of salt stimulate chemical changes in storage butter and that it is therefore detrimental to keeping quality.

It is found that lightly salted butter has superior keeping quality.

It is stated that salt is one of the factors which contribute to the development of fishy flavour in butter. Lecithin dissolves in salt solutions and salt accelerates the change of lecithin into trimethylamine, which is the fishy-flavoured substance. Several other factors are involved, and the mere presence of salt and lecithin does not predicate the development of fishy flavour. In fact, fishiness is not a common flavour defect of butter.

It is interesting to note the legislation for butter regarding the percentage of salt it may contain.

Salting .. must be all dissolved, and not over 2 per cent salt, unless the butter is destined for a purchaser who requests over 2 per cent salt.

We might summarize this :

1. Salt is desirable in most creamery butter because of consumer preference.

2. It inhibits growth of micro-organisms.

3. It checks mould growth, which is important in marketing.

4. High salt content may, and frequently does, accelerate deterioration of butter.

5. High salt in high-acid butter is definitely more detrimental than in low-acid butter.

6. Salt content of 2 to 2.5 per cent is recommended in sweet cream or first-grade cream butter.

7. Less than 2 per cent salt may be more suitable for second-grade cream butter. Some of this butter may have a sales advantage if entirely without salt.

Hair Tonics [illegible]

THERE are almost as many types of hair tonics as there are hair and scalp conditions requiring treatment. For falling hair there is one group of preparations, for oily hair there is another, and still another type of hair tonic is designed to promote the growth and give lusture to the hair.

The latter type is probably the most popular and may contain such ingredients as glycerin, alcohol, castor oil, sulphonated castor oil, deodorized mineral oil, diethyl phthalate, potassium sulphate, resorcinol, formaldehyde, formic acid, sodium lauryl sulphonate saponine, etc. As solvents, water, alcohol, glycerin, mineral oil and chloroform may be used. Excessive irritation caused by some solvents can be counteracted or reduced by the addition of diethyl phthalate. An emolient effect is achieved by sulphonated castor oil while the formation of dandruff is checked by potassium sulphate. Quinine is often present for the prevention of dandruff. A germicidal effect is imparted by benzoic acid, esters of benzoic acid, carbolic acid, resorcinol, etc., while saponine and soap provide foaming qualities. Sodium lauryl sulphonate and sodium cetyl sulphonate, soap, sulphonated oils, etc., act as detergents.

FORMULATIONS.

Following are a few suggested formulations :—

I

Chloral hydrate	2	parts.
Deodorized castor oil	18	"
Alcohol	80	"
Perfumed compound	2	"

A preparation of this type would be especially suitable for the treatment of dry hair.

II.

Diethyl Phthalate	4	parts.
Formaldehyde	[illegible]	[illegible]
Distilled water	15	[illegible]
Perfume compound	1	[illegible]

A mixture of this type would be especially suitable for the treatment of oily hair.

As, a suitable base often incorporated in more recent formulations, cholesterin, lecithin, vitamins, hormones, and possibly even sulphur come into question. Difficulty is sometimes exprienced in obtaining a clear solution when using cholesterin of which an addition of 0.3 to 0.5% may often be made. Such difficulties may be prevented by an addition of glycerin in combination of certain essential oils and fatty oils while the solution will be hastened by warming the alcohol slightly. A formulation for cholesterin-containing hair tonics would be as follows :—

I.

Cholesterin	3	parts.
Glycerin	27	"
Isopropyl alcohol	200	"
Absolute alcohol	810	"
Perfumed compound	15	"
Distilled water	45	"

II.

Cholesterin	2	parts.
Tincture of capsicum	10	"
Lecithin	10	"
Alcohol	900	"
Perfumed compound	10	"
Distilled water	65	"

Sometimes emulsions possibly also containing cholesterin are preferred and the following suggestions may provide some ideas :

III.

Cholesterin	1	part.
Lanolin	1	[illegible]
Groundnut oil	[illegible]	[illegible]
Cocoa butter	1	[illegible]
Glycerin	5	[illegible]

Borax (½ per cent solution)	100	parts

Dissolve the cholesterin in a mixture of the lanolin, groundnut oil and cocoa butter by the application of heat. Next heat the glycerin and sodium choleate and combine the two solutions while hot. Now stir in the borax solution previously heated to the same temperature of the mixture. Continue stirring until the whole mixture cools down to the room temperature.

SKIN REGENERATING TONIC

These are principally composed of cholesterin and lecithin. A formula of this type follows:—

Cholesterin	1	part
Lecithin	0.3	..
Alcohol	200	parts
Castor oil	3	..

Dissolve the ingredients by the application of gentle heat and then allow to cool. Lastly add the following mixture:—

Alcohol	60	parts
Distilled water	35	..
Quinosol	0.5	part
Salicylic acid	0.2	..

SULPHUR CONTAINING HAIR TONIC

Powdered sulphur 25 parts is heated with butyl glycol 100 parts until the sulphur is almost completely dissolved. This solution is allowed to cool, then added to the alcohol which will cause a partial precipitation of the sulphur with the balance remains in solution in the alcohol. In this method preparations are made which will contain sulphur either in complete solution or in semi-colloidal suspension. The sulphur content should be about 0.05%.

A hair tonic containing sulphur but very low in alcohol content can be made as follows:—

Colloidal sulphur (24% solution in glycerin)	10	parts
Resorcinol	4	..
Turkey red oil (neutral)	2	..
Alcohol	5	..
Distilled water	79	..

Dissolve the resorcinol in the water to which add the mixture of Turkey red oil and alcohol. Finally incorporate the sulphur-glycerin solution.

Hair preparations with low alcohol content have the disadvantage of not being easily absorbed and showing the tendency to run off too easily. This can be remedied by suitable additions of fatty materials such as 0.1% sulphonated lauryl alcohol or 0.5 to 0.8% cocoa butter soap which has the added advantage of rendering the hair pliable and glossy.

ADDITION OF MENTHOL

Small additions of menthol will add a cooling effect to any hair tonic but should not exceed approximately 0.2%. The use of lactic acid (0.2%) will tend to inhibit the secretions of the scalp and reduce the itching it causes.

SELECTION OF PERFUME

The selection of the perfume compound should be studied carefully, not only for the odour but also for the suitability of the various essential oils used. Certain oils provide not only an agreeable fragrance but also possess a germicidal effect so that they offer a double contribution to the finished preparation. Oil of thyme, lavender, cloves, bay, cinnamon, estragon and basilicum fall into this classification. The terpeneless oils are fragnantly used in view of their greater solubility.

The importance of the perfume compound used cannot be overemphasized as many an otherwise excellent hair preparation goes unused and un-sold due to an unpleasant basic odour which could be ovecome by expert perfuming.
be overcome by expert perfuming.

Cholesterol	1	part
Lecithin	0.5	..

Vitamin F (so-called)	3	parts
Benzyl alcohol	0.4	part
Amyl salicylate	0.8	,,
Jasmin compound	0.1	,,
Carnation compound	0.2	,,
Ethyl acetate	0.5	,,
Beta-naphthol	0.1	,,
Alcohol	100	parts

Pilocarpine nitrate	[illegible]	[illegible]
Quinine salicylate	[illegible]	
Tannic acid	[illegible]	
Castor oil	0.20	
Water	24.10	par[illegible]
Rose water	25.00	
Alcohol	50.00	

Manufacture Of Soft Soap

SOFT soap is a kind of washing soap extensively consumed by large establishments. Besides being used in enormous quantities by the cotton and jute mills in the dressing of fibres, it is largely employed for various washing purposes by steamship, railways, large buildings, hosiery manufacturers etc. In fact, this article is universally used in all washing operations of magnitude with soap solutions. Being cheap and soft in consistency a solution can be prepared easily even in the cold. Moreover, in the manufacture of this soap any kind of soft stocks can be used. Even the foul smelling fish and whole oils can be employed in its manufacture to obtain cheaper classes of soap meant for washing purposes where the odour of the oils is not a handicap. Soft soap produced with better classes of oils and fats using principally caustic potash is also the basis of all kinds of liquid soaps.

CHARACTERISTICS OF SOFT SOAP

A good soft soap should not be plastic, not too sticky and should not be stringy in any account. It should possess a short-grained structure and should not show threads when drawn out. It must contain a little free caustic but not more than 1.5 per cent. It may be mad[e] to fig if desired to suit the require[-] ments of the market. At on[e] time figging was regarded as an indicatio[n] of genuine soft soap but now-a-days i[t] is no longer considered essential as figgin[g] can be produced even to inferior type o[f] soft soap by the incorporation of a certai[n] amount of tallow in the composition an[d] by the use of some caustic soda in plac[e] of caustic potash. The figging is cause[d] by the separation of sodium stearate in [a] crystalline form. It is best to av[oid] to avoid figging since in trying to produc[e] the phenomenon, the proper and desirabl[e] consistency and texture of the soap ar[e] interfered with.

Soft soap is a completely saponifie[d] soap without the subsequent operation[s] of salting, graining or fitting, that is to say, the soap is finished with the saponi[-] fication, the glycerine remaining in the lye. As the saponified charge is no[t] salted, great care must be taken to use alkali just enough to obtain complete saponification. The proper consistency and texture depends on several factors a[s] already stated, under correct conditions of manufacture a soap of the required speci[-] fication can be produced.

FATTY MATERIALS [illegible]

These are the animal and vegetable [illegible], of the animal oils, those of the fish, shark, seal, whale, etc. are chiefly used; the vegetable oils are olive, linseed, groundnut, castor, cotton seed, colza, poppy, etc. Sometimes oleic acid, palm oil, coconut oil and small quantitnes of tallow and rosin are also employed in the manufacture, but the latter is only used to give the soap a granular or fig-like appearance.

ALKALI USED

The alkali employed in the manufacture of soft soaps is caustic potash, and it is a characteristic of all soaps made with this alkali that, instead of assuming a hard, solid consistence, as is the case with soaps made from caustic soda, they are always soft, tenacious, and more or less transparent. Moreover potash soaps always contain a large percentage of water, more in a state of mechanical mixture than in chemical combination; and while 3 parts of fatty matter will generally yield about 5 parts of soda soap, the same proportion of fatty matter, treated with caustic potash lye, will yield 6 to 7 parts of potash soap.

Potash lyes cannot be separated from the soap, as in the ordinary method of purifying soda soaps; therefore the lyes employed wholly enter into the composition of the soap. Much care is therefore necessary to avoid introducing too great an excess of the alkali.

Sometimes manufacturers employ [illegible] proportions of soda with [illegible] potash lyes, by which the [illegible] soaps made with them ac[illegible] consistence than when [illegible] is used, besides which [illegible] by using a pro[illegible] alkali. When this is the case the caustic soda [illegible] solved with the potash in the first [illegible] the proportion of soda to that of [illegible] being from 12 to 20 per cent but when a larger proportion of soda is used, the resulting soap will not be so transparent as ordinary soft soaps.

SELECTION OF STOCKS

The selection of oils and fats requires great care and experience. Unless these are propertly selected the finished soap may be either hard or semi-boiled according to the hardness of the blend used. If the stocks selected are comparatively soft and if only caustic soda is used, a gelatinous stringy soap is produced. As the non-stringy soap is more softer than a soap which is stringy, the gelatinous character of the soap must be reduced by the substitution of caustic soda by caustic poatsh.

FORMATION OF SOAP

In the manufacture of soft soap no particular formula is followed by manufacturers because the main difficulty is the variation of prices of raw materials. So after keeping the quality intact the formulas are modified to suit the requirements. In order to deduce a suitable formula let us mention here some experimental results as carried out by Dr. Dutt.

(1)	Groundnut oil	40 parts.
	Linseed oil	20 "
	Cottonseed oil	20 "
	Tallow	20 "

This blend with 80 per cent caustic potash and 20 per cent equivalent caustic soda produce a highly stringly soap but with caustic potash alone it is rendered almost non-stringy.

(2)	Tallow	5 parts
	Groundnut oil	20
	Cottonseed oil	20
	Linseed oil	[illegible]
	Rosin	[illegible]

equivalent caustic soda but gives the perfect non-stringy soap with caustic potash only.

(3) Tallow 5 parts.
Groundnut oil 13 "
Cottonseed oil 10 "
Linseed oil 67 "
Rosin 5 "

This blend with 80 per cent caustic potash and 20 per cent equivalent caustic soda gives an almost non-stringy soap with only a slight thready tendency.

(4) The following charges produce with 70 per cent caustic potash and 30 per cent equivalent caustic soda produces a non-stringy soap :

I.

(a) Coconut oil 2 parts.
Cottonseed oil 15 "
Linseed oil 73 "
Rosin 10 "

II.

(b) Coconut oil 2 parts.
Linseed oil 73 "
Castor oil 20 "
Rosin 5 "

(5) The following blend with higher percentage of castor oil produces non-stringy soft soap with caustic soda alone :—

Coconut oil 3 parts.
Linseed oil 50 "
Castor oil 35 "
Rosin 12 "

(6) The following examples further illustrate the formulation of soft soap charges which may assist manufacturers with suitable blends for soft soap :—

Groundnut oil 56 parts.
Linseed oil 32 "
Rosin 12 "

in caustic potash.

Fish oil [illegible]
Castor oil [illegible]
Rosin 10

This blend gives a perfect soft soap with 50 per cent caustic soda and 50 per cent caustic potash.

Fish oil 37 parts.
Castor oil 38 "
Linseed oil 5 "
Rosin 20 "

This charge can be worked out with 76 per cent of caustic soda and 24 per cent caustic potash to obtain good soft soap.

Fish oil 54 parts.
Castor oil 46 "

This charge can be worked out with 76 per cent of caustic soda and 24 per cent caustic potash to obtain good soft soap.

Fish oil 54 parts.
Castor oil 46 "

This blend can be worked entirely with caustic soda to obtain non-stringy soft soap.

Hence from the above facts it is easy to build up a suitable formula by the manufacturers without any difficulty and run their factories efficiently. Of course, the manufacturers can use only one kind of vegetable oil instead of a mixture of several oils and fats. In their case the following points are to be observed.

Linseed oil soda soap is stringy whereas the corresponding potash soap is non-stringy with a desirable body. Groundnut oil soda soap is stringy whereas groundnut-potash soap is non-stringy. Cottonseed soap with caustic soda is a solid article having none of the

properties of a soft soap while the potash soap is very sticky and stringy. Rosin forms a potash soap which is stringy with gum-like stickiness.

PROCESS OF MANUFACTURE

In making soft soap, the selected oils are first put into the pan, and moderate heat applied until the oils have become thoroughly liquefied when one-third of the lye diluted to 6° to 8°Be is run in gradually, with continuous strring, until a perfect combination of the alkali and fatty matters is effected, which is determined by the mass assuming a perfectly homogeneous condition, there being no uncombined oil on the surface or lye at the botton of the pan. The mixture is then gently brought to a boil, and this is kept up, with stirring, for several hours. As soon as the paste assumes a moderate degree of consistency, additions of another one-third of the lye, at 12° to 15°Be, are to be gradually, that is a few gallons at a time every 15 minutes or so, continuing to do this with constant boiling for a few hours, during which time the added alkali will become gradually absorbed.

During the boiling a considerable amount of fob or foam is formed, but this eventually subsides when the operation is getting near completion, and the mass becomes limpid and transparent. The soap is now to be treated with the remaining one-third of the lye making it at 22° to 25°Be, added as before in small quantities at a time at short intervals. By continued boiling, and consequent evaporation of the water from the lyes, the soap acquires a greater degree of firmness, and samples should be taken occasionally and examined by pressing between the finger and thumb, in the usual way adopted by soap boilers; and when the proper consistence is nearly arrived at, small sample should be set aside to cool, in order that their actual condition may be ascertained. If the soap when tried between fingers, is stringy, the boiling must be continued, and if it does not possess a sufficiently alkaline taste, an addition of strong lye must be made and the boiling kept up until the proper consistence is reached.

BOILING

In boiling soft soaps, great care is taken that the ebullition is very gentle at first, owing to the powerful action exerted by the chemical union of the alkali and the fatty matter, during which a considerable frothing occurs. If this caution were not observed the mass would speedily boil over. When examining samples of the soap, if saponification is complete narrow opaque fringe appears round the outer edge of the sample, when the soap is said to be to strength; when this appearance is not present it is said to want strengh; or if the opaque fringe first appears and then vanishes, it is said to have false strength, and indicates that the saponification is complete.

Besides the above usual process of making soft soap by adding the caustic into the hot mixture of oil we summarised a good process from Soap Making by Dr. R.L. Datta for the benefit of our readers. The process is as follows :

The best manipulation for saponification, however, consists in taking the calculated quantity of caustic alkali sufficient to effect complete saponification. The caustic potash or soda required for a soft soap charge can be obtained from the saponification value of the mixture with an excess to furnish 1 to 1.5 per cent free alkali to the finished soap. This excess is provided by using the theoretical quantity 2 per cent excess caustic alkali calculated

[illegible]

of [illegible] is brought to boil and then the [illegible] charge is added as quickly as can be managed without the contents frothing over. Emulsification follows with rapid saponification, and the process is usually complete with boiling for a few hours adding water when necessary. If rosin be a constituent of the charge it is best added towards the end and completion of the saponification of the other ingredients. In this case the quantity of the alkali being more in excess than usual from the start, rapid and complete saponification takes place. After complete saponification and gradual thickening, the soap attains a stage at which it begins to congeal and finally assumes a neat and glossy appearance with the subsiding of the froth. This stage which has to be regarded, not as the exact end point, at least the point without reaching which the soap cannot be held as finished. There is a limit to the amount of moisture that can be retained by a properly finished soap which possibly depends on the nature of the blend. The moisture content of soft soap from different blends, however, varies within narrow limits. The finished soap is preferably

The above process has the following advantages over the usual process of adding caustic alkali gradually and testing the end point :

(a) Calculated quantities with the just necessary excess being added, the alkalinity of the final soap will be the same as required.

(b) The necessity of testing the end point for free alkali or free fat which introduces uncertainty is dispensed with provided the charge is boiled enough to ensure complete saponification.

(c) A high concentration of alkali will be present from the start and hence the saponification will proceed with extreme rapidity. The concentration is further increased by adding the rosin charge towards the end after the saponification of other stocks is quite complete.

(d) There is no trouble of adding alkali of different strengths and the sudden solidification during the addition of alkali, particularly when the alkali added is all reacted upon.

[illegible] No. 510.

Canning Vegetables

BEANS

BEANS are canned for their pods (string beans), which are fleshy, tender and crisp, or for their seeds after they have become more matured. Some shell beans, as the navy or pea beans, are allowed to mature and are then canned as baked beans, as pork and beans, or beans with tomato sauce.

Commercial canners use for four principal varieties: Refuge for pods, Lima, Red Kidney, and Navy or pea beans for seeds. The small canner might well add to this list some of the tender stringless wax beans, the young tender Kentucky Wonder beans for pods and the more matured Kentucky Wonder and the horticultural types for seeds or as shell beans.

String Beans.—The pods should be young and tender and practically free from strings or woody fibres. They should be canned while fresh as they lose quality after picking. They are thoroughly washed, then snipped, that is, the stem end and blossom end are cut off with a knife. The pods may be entire or cut into short lengths—off with a knife. The pods may be entire or cut into short lengths—about one inch. The prepared beans are then placed in a wire basket or cheesecloth bag and blanched in hot water for 3 to 5 minutes—depending upon the size of the beans. They are then cooled in cold water. They should be packed moderately tightly into the containers. A teaspoonful of salt is added to each pint jar and the jar is filled with hot water. Glass jars are partially sealed and processed in hot water bath at 212°F. pints 100 minutes, quarts 120 minutes; or under 10 pounds of steam pressure, pints [illegible] quarts 40 minutes.

Shell Beans.—In this class would be placed the pole beans, the horticultural varieties, the Red Kidney and Limas. All these are handled in practically the same manner except the Limas which are picked while the pods are still green and while only a small per cent of the seeds have become white. All others are picked when the pods have become somewhat ripened, that is, the pods are pliable and leathery but not dry. They shell easily and the seeds are large and plump, but still fairly soft and tender and of excellent quality. The beans should be hulled or shelled soon after picking. They are washed and blanched in boiling water for 3 to 5 minutes, then chilled in cold water. The blanching has shrivelled the beans somewhat and therefore they should not be packed too tightly. They are shaken lightly into the containers filling to within ½ inch of the top. A teaspoonful of salt is added to each pint and hot water is added to fill the jar. Glass jars are partially sealed and processed in hot water bath at 212°F., pints 160 minutes, quarts 180 minutes; or under 10 pounds steam, pints 50 minutes, quarts 60 minutes.

A small chunk or slice of pork or of good lean bacon will add to the attractiveness of any of the shell beans except possibly the Limas.

Baked Beans.—Beans are baked the same as for table use except that the cooking may be stopped before the beans are quite done, and the liquor should be in greater abundance. The baking should not proceed until the beans become broken. They are filled into the containers, making only a moderately close pack. Enough of the hot liquor is added to fill the spaces and cover the beans, and the container is filled to the

[illegible] there is enough [illegible] liquor then hot water must be substituted. Glass jars are practically sealed and processed in hot water bath at 212°F., pints 100 minutes, quarts 120 minutes; or under 10 pounds steam pressure, pints 35 minutes, quarts 40 minutes.

BEETS

The dark beets are best for canning. The tops should be cut off about 1 inch above the beet to avoid excess loss of colour during the blanching period. Beets for canning should be small, varying from 1 inch to 2 inches in diameter. The medium or smaller sizes are most desirable; above 2 inches they should be canned in slices or chunks.

The beets are first thoroughly washed and then boiled or steamed until the skin slips easily. They are then cooled in cold water. The top and root are off and the skins removed. If the blanching has been thoroughly done the beets may be easily squeezed out of their skins. The beets are graded and packed as tightly as practicable into the containers. A teaspoonful of salt is added to each pint jar and the jar is then filled with hot water. Glass jars are partially sealed and processed in water bath at 212°F., pint 90 minutes and quarts 100 minutes; or under 10 pounds steam pressure, pints 35 minutes, quarts 40 minutes.

CORROTS.

The small carrots which are often thinned out of the rows, also the small ones at harvest time, "the fingerlings", are generally wasted. These are delicious when canned. Also if storage facilities are lacking the larger carrots may be canned for use in the winter diet. The younger carrots are usually canned whole. They may be given only a thorough washing preparatory to packing or they may be blanched for a few minutes to facilitate packing and to improve their appearance. The larger carrots are usually split lengthwise or cut into thin transverse slices. Before cutting into slices the larger carrots are scraped to remove the tough skin or they may be blanched in hot water long enough to cause the skin to slip easily. If the skin is scraped off the sliced carrot should be blanched 3 to 5 minutes to facilitate packing and to improve the appearance. The prepared carrots are packed tightly into clean, dry jars. A teaspoonful of salt is added to each pint jar and the jar is filled with hot water. The jars are partially sealed and processed in the water bath at 212°F., pints 80 minutes, quarts 90 minutes; or under 10 pounds steam pressure, pints 30 minutes, quarts 35 minutes.

CAULIFLOWER

The heads are separated into small pieces and placed in a weak brine (4 tablespoonfuls salt per gallon of water) for several minutes. The material is then blanched for 3 to 5 minutes in boiling water and cooled at once in cold water. The pieces are packed tightly into clean, dry containers. One teaspoonful of salt is added to each pint jar and it is filled with hot water. Glass jars are partially sealed and processed in water bath at 212°F., pints 100 minutes, quarts 120 minutes; or under 10 pounds steam pressure, pints 25 minutes, quarts 40 minutes.

CORN

Commercial concerns can corn principally in two styles. In one of these the tips of kernels are cut off and the milky pulp is scraped from what remains on the cob. These tips of kernels together with the scraped corn are mixed with the sweetened brine forming a thick creamy product. Corn canned in this style is known as

cream corn of Main style. In the second method the whole kernels are cut from the cob and mixed with a weak brine. This is known as Maryland style.

The home or farm factory canner may follow either of these two methods. As a general practice, however, where corn is canned in small quantities, it is put up in the home style of which there are two general methods. First: the corn is cut or scraped from the cob, packed into containers and the usual amount of salt is added. No liquid is used. The corn is said to be packed in its own milk. Second: the corn is given a short preliminary cooking (blanched) and is then cut from the cob in thin slices and scraped only to secure the very tips of the kernels.

Each of these two methods of home style packing of sweet corn has its good and its bad points. The second method however is preferable because the finished product makes a much better appearance in the glass container: the food value must rank higher since more of the coats of the kernels are included: there is less bother in cutting and packing the blanched corn; there is not as strong a tendency to overpack the containers, and finally the danger from souring before processing begins is reduced to a minimum.

Corn for canning should not be too young because at that stage its food value is low and the quality and flavour have not fully developed. Nor should it be too old as it will be tough and of low quality. It is at its best when in the latter part of the milk stage, and may be handled successfully up to the heavy dough stage the stage in which the milk becomes doughy [illegible]. It is most nutritious [illegible] quality during the last few [illegible] period.

[illegible] be picked long before [illegible] deteriorates rapidly.

The husks may be most easily [illegible] removed if the shank of the ear is cut through just grazing the bottom [illegible]. This frees the husks at the butt of the ear and with two or three quick movements they may be separated at the point of the ear and quickly removed together with the larger of the silk. The complete removal of the silk is most easily accomplished by means of a stiff fibre or bristle brush.

The corn is next submerged in boiling water for 5 to 6 minutes. It is then cooled quickly in cold water and is ready for cutting. The corn should be cut in thin, even slices making two or three cuts to remove the greater part of the kernels. The extreme inner tips should be scraped out to avoid excess of chaff. The knife must be sharp and the stroke or cut should be from tip to butt of ear.

The cut corn is shaken somewhat loosely into the containers, which are filled to within ½ inch of the top. A teaspoonful of salt is added to each pint jar. Hot water is then poured in to fill the jar. The corn is stirred in the container with a spatula or knife to insure escape of all air bubbles. If necessary more water is added to fill the jar.

Another method of packing which will insure a uniform amount of corn in each jar is as follows: The cut corn is weighed and placed in a kettle. One cup of water and teaspoonful of salt are added for each pound of corn. The kettle is set under the fire and is heated, with occasional stirring, to the boiling point. The hot corn is filled into the containers to within ½ inch of the top. The caps are sealed while hot. Glass jars are partially sealed are processed in water bath at 212°F., and pints, 3 to 4 hours or under 10 pounds steam pressure, [illegible] minutes.

Corn on Cob.—Corn may be [illegible] on the cob. Though not economical [illegible]

[illegible] a very satisfactory diversion from the ordinary canned corn.

[illegible]-sized ears should be chosen. If Golden Bantam or other variety of similar type is used, about 8 to 10 ears may be packed in a two-quart glass jar. Quart jars will hold about 4 to 5 ears.

The corn is prepared as for the general type of canning except that it is not cut from the cob. The ears are packed as tightly as possible into the containers. A teaspoonful of salt is added to each quart jar and the jar is then filled with hot water.

Glass jars are partially sealed and processed in water bath at 212°F., quart jars 3½ to 4 hours, two-quart jars 4½ hours; or under 10 pounds steam pressure, quart jars 70 minutes, two-quart jars 80 minutes.

GREENS

Many leaf plants both wild and cultivated are used for greens. Among the more important ones are chard, beet tops, dandelions, and spinach. All greens should be gathered while young and tender. They should be canned while fresh. The greens are carefully looked over and all undesirable parts are discarded. Thorough washing through several changes of water is necessary to remove all soil and sand. The washed greens are then blanched in steam for 20 minutes or in boiling water for 4 minutes. After cooling in cold water they are packed into the containers. They may be left whole or cut into short lengths. In either event great care must be exercised to prevent overpacking. The pack should be only moderately tight. When greens are closely packed the processing becomes a very uncertain thing and generally percentage of spoiled packages run high. As a means of facilitating processing the following [illegible] is used. Approximately 2 pounds of [illegible] greens may be packed into [illegible] jar. After packing the greens are [illegible] leaving a thin [illegible] reasonably free circulation of [illegible] take place during processing. [illegible] tens the time of raising the centre of container to the temperature of the [illegible] cesser and thereby reduce the [illegible] ties of spoilage. After packing and [illegible] the greens, a teaspoonful of salt is a[illegible] to each pint jar. Glass jars are parti[illegible] sealed and processed in hot water bat[illegible] 212°F., pints 120 minutes; or under [illegible] pounds steam pressure pints 50 min[illegible]

One of the most attractive of all greens results when the tender beets [illegible] greater than ½ inch in diameter are [illegible] attached to the tops. Such greens may [illegible] obtained in abundance by sowing [illegible] beets quite thick and thinning them w[illegible] of the proper size. The beets are so yo[illegible] and tender that they require no spe[illegible] preparation other than a thorough wa[illegible]ing. The entire plant is blanched as [illegible] canning any green.

HOMINY OR HULLED CORN

Hominy or hulled corn may be m[illegible] from sweet corn or from the common fi[illegible] corn, either the flint or dent type.

The corn is shelled and placed in [illegible] porcelain or iron kettle. To each pint [illegible] corn two quarts of water and two roun[illegible]ed teaspoonfuls of concentrated lye a[illegible] added. The corn is boiled slowly for 20 [illegible] 30 minutes, and stirred frequently duri[illegible] the latter part of cooking. It is then r[illegible] moved from the fire and allowed to sta[illegible] for 15 or 20 minutes. Next it is thoroug[illegible]ly washed to remove the excess of ly[illegible] after which it is either rubbed vigorous[illegible] through the hands or placed in a chu[illegible] with water and thoroughly churned f[illegible] several minutes. The churning or rub[illegible]ing is necessary to remove the black ti[illegible] and softened hulls.

When the black tips [illegible] separated from the corn by [illegible] on the wash water or by placing [illegible]

[illegible] a coarse sieve and washing thoroughly, the hominy material is allowed to stand for several hours, during which time the water is changed frequently, or it may be thrash-cooked, that is, covered with water and brought to a boil for a few minutes, after which the water is drained off and fresh water is added and this is repeated until all excess lye has been removed.

After the excess lye has been removed the hominy is cooked in water until tender. If the hominy is placed in a fine-mesh wire basket and set in a vessel of water no stirring is necessary. If no basket is available, frequent stirring must be given.

When the hominy has become tender it is packed and processed in the same manner as shell beans.

PEAS

Peas are one of the most difficult vegetables to can successfully. There are perhaps many causes for this. Those most likely to occur with home canners are over-packing, under-processing and packing without grading. Peas as they usually come from the garden contain pods in practically all stages of development. When the peas are shelled many of them are quite matured. In any given variety of peas the size is an index to the age. This fact may be utilized by the small canner to grade the peas into sizes which shall correspond to their ages. Cellar window wire has a square mesh and may be bought with several sizes of opening. If screens are made from ¼ inch and ⅜ inch mesh the canner may grade the peas into at least three sizes by sifting them through these screens.

Peas should be canned as soon after [illegible] as possible. They are first [illegible] to remove any soil that may be on [illegible] when they are shelled. The shelled [illegible] washed and graded. They are [illegible] for [illegible] 10 minutes, depending [illegible] the peas. They should be [illegible] the skins wrinkle but not long enough to cause them to burst. [illegible] blanching they are cooled in cold water, then packed lightly into containers. Since peas will swell somewhat they should not be packed very tight. A teaspoonful of salt is added to each pint and hot water is used to fill the jar. Glass jars are then partially sealed and processed in water bath at 212°F., pints 3 to 4 hours; or under 10 pounds steam pressure, pints 45 minutes. The processing periods are given for medium-matured peas. Increase the time about 10 per cent for larger and older peas and shorten it 10 per cent for the smaller and tenderer peas.

SWEET PEPPERS

The ripe sweet pepper is much prized by many housewives for garnishing salads and for flavouring. These peppers are very easily canned and the farm factory will find a good market for them if packed in small containers. The half-pint or quarter-pint jar makes a suitablesized package.

If to be used for garnishing the peppers should not be picked until well ripened. If for flavouring they are canned either green or ripe as desired.

Two general methods are [illegible] used: (1) The ripe peppers are washed, then blanched in boiling water long enough to loosen the skin, and then cooled. Or the washed peppers are placed in the oven and baked or roasted long enough to loosen the skins. The core, seeds, and skin are removed and the peppers are either cut into strips or may be packed whole.

(2) The peppers are washed. The base carrying the stem is cut out and the seeds and white core are removed. The peppers are split along one side, laid on a cutting board and cut transversely into narrow strips ¼ inch or less. These strips are blanched for 5 minutes, cooled in cold water and packed loosely [illegible]

small jars; salt at the rate of ½ teaspoonful to each half-pint is added and the jars are filled with hot water. The jars partially sealed and processed in the water bath at 212°F., half-pints 70 minutes, pints 90 minutes; or under 10 pounds steam pressure, half-pints 30 minutes, pints 35 minutes.

PUMPKIN.

Pumpkin is most economically canned in the form of pulp. The pumpkins are washed and cut into halves, cutting from stem to blossom side. The seeds and their coarse adhering fibres are scooped out with a large spoon. The halves are then set in a steamer cup side up and steamed until tender throughout. A deep with a wire rack on the bottom and a fairly tight cover makes an excellent steamer for this work. When somewhat cooled the pulp is removed with a spoon, mixed with water to the consistency of a pie filling and is then packed into the containers which are filled to within ½ inch of the top. A half-teaspoonful of salt is added to each pint jar. Glass jars are partially sealed and processed in hot water bath at 212°F., pints 100 minutes, quarts 120 minutes; or under 10 pounds steam pressure, pints 40 minutes, quarts 45 minutes.

The pumpkin may be cut into thin slices, peeled and these slices cut into small pieces. The pieces are blanched just long enough to make flexible but not soft (2 to 3 minutes). The pieces are packed tightly into clean jars. A half-teaspoonful of salt is added to each pint and the jars are filled with hot water. The jars are partially sealed and processed as given above. Or the peeled pumpkin may ba cooked in a small amount of water until reduced to a fine pulp of desired consistency after which it is packed and processed the same as steamed pumpkin.

TOMATOES.

Tomatoes should be well ripened on the vines. They should be handled carefully and they must be absolutely free from rot. They should be good in colour and to some extent [illegible]. Tomatoes that have considerable [illegible] around the stem should be avoided. If one must can them, all the green [illegible] should be cut away.

Tomatoes are first thoroughly washed to remove all soil. They are then blanched in boiling water for about one minute or just long enough to cause their skins to slip easily. As soon as blanched they are cooled in cold water and are then ready for peeling and coring. Over-blanching will make the tomatoes [illegible] and under-blanching will cause waste of time removing their skins.

The cores should be removed first. This is done with a short-blade, sharp pointed knife. By inserting the knife at the base of the tomato near the stem [illegible] to about the centre of the fruit, and cutting around the stem, keeping a half-inch or more from it, a cone-shaped portion is quickly removed. This is mostly [illegible] material and is not desired in the canned product. A few trials soon enable one to judge as to the size of cut necessary to remove the entire core.

The skins are then stripped off. This is most easily done by beginning at the blossom end. Often there is a small black spot at the blossom end which should be cut out. When a sufficient quantity of peeled tomatoes has been secured they are packed into the containers. If too large to pass readily through the opening they are cut into suitable size and are then packed closely enough to cover the solids.

Glass jars should be packed full. A half-teaspoonful of salt is added to each pint jar. Glass jars are partially sealed and processed in the hot water bath at 212°F., pints 30 minutes, quarts [illegible] minutes.

Foam Baths

BY DR. FRED WINTER

THESE pulverulent or liquid preparations produce about 100 litres of profuse, close and stable foam when properly used.

As will be seen further on this foam keeps its integral volume for at least 40 minutes: then it goes down slowly..

GENERALITIES REGARDING ALL OF FOAM BATHS.

For domestic use foam required is produced by agitating a hot solution of the special preparation until a sufficient volume of very close foam is obtained. In bathing establishments, foam is produced mechanically by means of a special generator fitted on the bath, a rapid current of compressed air, oxygen or carbonic acid being forced through the liquid base. Obviously, such a foam generator facilitates foam baths. In some instances effervescent foam bath preparations containing fairly proportions of sodium bicarbonate etc. are used: they automatically produce the foam required.

The essential base present in most foam bath preparations is a special soap of a high foaming capacity, or a concentrated extract of soapwort roots, Panama wood, etc. In most cases however, a mixture of fatty alcohol sulphonates, pure saponine and sapamine is used. In order to improve the density of the foam, some [illegible] gum is often added (gum arabic [illegible]canth gum), also powdered gela[illegible] dextrine, etc. For the same purpose [illegible] kaolin, starch or oat meal may [illegible]. For this kind of soapy pre[illegible] it is advisable to add some cal[illegible] [illegible]phosphate) in order to [illegible] forming. Moreover, [illegible] the foaming capacity of [illegible] preparations.

SOAPY FOAM BATHS.

First prepare a special soap from the following fatty mixture:

Coco fatty acid	50 parts
Stearine	20
Palm fatty acid	30

Melt this fatty mixture, saponify with the corresponding quantity of strong caustic lye (consisting of 15% KOH 38 Be and 85 p.c. Na OH 38°Be).

After careful neutralising, dry the soap chips and rub to powder.

Next prepare the following mixture which constitutes the basic preparation for foam baths:

Special soap, powdered	100 parts
Soluble starch	0.5 ,,
Sodium Sulphoricinate	1 ,,
Powdered stearin	5 ,,
Sodium bicarbonate	3 ,,

For a complete bath, take 240 gr. of this mixture, which yield about 100 litres of foam. This foam is extremely stable and in 24 hours it does not lose more than 10% of its initial volume.

Here are detailed recommendations for use:

Rinse the bath with 5 litres of boiling water. Then sprinkle 250 gr. of the soap preparation on the bottom of the bath and run in 10 litres of hot water, stirring until complete solution. Work up the foam high enough to allow the bather to plunge in it up to the neck.

Simultaneous presence of powdered s t e a r i n and sodium bicarbonate i n t h e m i x t u r e [illegible] the liberation of small quantity [illegible] carbonic acid which pleasantly [illegible]

... the skin. ... generator ... places himself on a wooden grating ... upon the bottom of the bath, after ... run in the hot solution of the ... preparation. Next he opens the top of the generator, which forces in the air, thus producing abundant foam. The average duration of a foam bath is from 30 to 40 minutes.

The cosmetic therapeutic action of foam is hyperemic which results in abundant perspiration.

NON SOAPY FOAM BATH PREPARATIONS.

As stated above, saponine or products containing saponine are frequently used for this purpose and in most cases these preparations are just concentrated decoctions (20-30°Be) of soapwort roots. Panama wood etc. These powders or liquids often contain pure saponine mixed with other substances. Frequently powdered gum is added (O, 3-O, 5%) Often these mixtures also contain fatty alcohol sulphonates, the use of these chemical derivatives being very popular for the preparation of modern foam baths. These prepartions are clearly compounded mixtures of sodium lauryl sulphonate, sodium bicarbonate. saponie, etc.

SAPONINE BATHS.

40 to 50 gr. of concentrated soapwort extracts (20-30°Be) are required for one foam bath. This corresponds with approximately 24 gr. of pure saponine (100 1. of foam).

COMPOUNDED FOAM BATHS BASED ON SULPHONATES, ETC.

Powdered (required for one bath: 40 ...)

1. Sodium lauryl sulphonate 40 grm.
Sodium bicarbonate 55 „
Powdered gum ...
Pure saponine ...
Perfume 1%.

2. Sodium lauryl sulphonate 60
Sodium metaphosphate 10
Powdered tragacanth gum 0.3
Borax 20
Soluble starch 8
Perfume 1%.

3. Sodium lauryl sulphonate 30
Powdered coco soap 40
Borax 10
Powdered gelatine 2
Soluble starch 8
Sodium metaphosphate 10
Perfume 1%.

Liquid (required for one bath: 10... 120 gr.)

1. Triethanolamine lauryl sulphonate 60
Sodium metaposphate 5
Powdered tragacanth gum 1
Water 34
Perfume 1%

2. Triethanolamine lauryl sulphonate 65
Powdered tragacanth gum 0.3
Water 32
Perfume 1%.

3. (acid)
Saponine citrate 40
Ctric acid 5
Powdered gum arabic 0,5
Water 55
Perfume 1%.

As perfumer for bath preparations we recommend fresh essences ... soluble in water. For good qualities the following should be used: Eau de cologne 228, English Lavender 275 and Lavender 278. For cheap qualities: Pine 82... Lavande 438, Fichten 290 and Kentucky 429.

Cancer Causing [illegible]

THIS article brought us in contact with Dr. Reding, who enjoys an international reputation in this field.

Dr. Reding, among other things, sent us the socalled Conclusions of Godesberg which were brought forward at the Congress for the Fight against Cancer, held this year at Sao Paulo, by Professor Druckney, the delegate of the Deutsche Forschungsgemeinschaft. These conclusions, in a moderate form, coincide with those of the Belgian commission.

Dr. Reding drew our attention also to a study of Hartwell of the National Cancer Institute at Behesda, Md., in which study 1333 chemical products were tested of which 322—or 24%—appeared to have cancer causing properties.

The Federal Security Agency in the U. S. A. has published this list and has compared it carefully with the list of raw materials which are used in the contemporary compounding of essences and aromatics for the food industry.

Upon comparing these two lists we came to the amazing conclusion that from the 1333 tested materials, only the following flavouring agents appeared to have cancer generating properties:—

- Chloroform
- Furfural
- Indol
- Scatole

Let it first be noted however that tests with these materials were made on animals and this under extremely abnormal [illegible].

[illegible] materials were brought into the [illegible] body in a completely unnatural [illegible] (i. e. through hypodermic injection) [illegible] unnatural dosages.

In addition, it is proven that [illegible] mal may be immune to a certain [illegible] which may cause in another. [illegible] toxiousness of certain materials to [illegible] human constitution on the sole [illegible] these artificially caused in animals [illegible] obviously not do.

In his earlier quoted book: New Horizons of Healing (page 50, 51) Dr. Griffith Evans writes the following on this subject:

It is a sad fact that almost the whole of cancer research now is concerned with manufacture of artificial carcinogens, and the demonstration to an astonished world that they will indeed produce cancer. These experiments have little or nothing to do with the clinical human cancers we have to treat every day.

In the case of chloroform instance, rabbits were injected hypodermically with a dosage of O. 08 to O. 02 cc. per kilogram of physical weight in order to cause cancer. This would be equal to an average dosage of 4 cc. for a human weighing 175 lbs.

The maximum amount of chloroform which, via flavours, is consumed by human being is only O. 0025 per kilogram of food. It follows that 1,600 kilograms of this food should be eaten in order to arrive in the critical, illness causing zone. Even then it must first be assumed that man is equally susceptible as the [illegible] and also that the human body, in the [illegible] that is taken to consume this quantity, which is probably more than [illegible] would not abduct the dosage of chloroform, at least in part, which on the contrary it does.

The case of Furfural, is [illegible] clear. Deviations in the liver of [illegible]

[illegible] The average dosage [illegible] or its derivatives, which it [illegible] possible to incorporate in food [illegible] without making them utterly inedi[illegible] would be 0.0001%.

It is clear that these are not reasonable proportions. If the creatures would have been fed with the same dosage no trace of illness would have appeared.

Moreover when it is considered that the coffee which we drink day after day and its derivatives, and that no one would ever consider making coffee responsible for the presence of cancer, then it becomes clear that the obtained results with animals may no way be considered when appraising this product for human use.

By several researches, Indol was used for making tests on chickens and rats, hypodermically injecting dosages of 0.1% to 0.004%. It is not said whether illness occurred either with the lowest of highest percentage. Another researcher however (Pentrinalli, 1926) reported not a single illness when using a further diluted dosage.

Through certain flavours an addition of at the most 0.0001% of indol can be made to the food because a larger amount would make the food unappetizing. This is far less than the dosage which proved harmful to chickens.. And again, a human is no chicken.

Finally, in 1910, Stocher and Wacker [illegible] a tumor in the ear of a rabbit through injection of 4% of Scatol dissolved in rabbit fat. All other researchers [illegible] negative results.

[illegible] purely flavouring point of view [illegible]

[illegible] stuff in his cassette. [illegible] tests made with 5% [illegible] prove anything against the use of this material.

The argument for prohibiting the use of artificial flavour, based on the study of Hartwell lacks all validity.

The same report however shows that a dosage of 0, 5 c.c. of ethyl alcohol per kilogram of body weight is able to generate cancer in mice. This dosage compares with 40 cc. per 80 kilogram, which is the normal weight of the average adult. There are millions of people who daily consume 40cc. and many times more than this in the form of beer wine and other spirituals. And it shouldn't surprise you that the same results are seen at the same dosage per kilogram of physical weight. Any physician will confirm that heavy drinking often die from cancers.

Yet we have never heard of anyone who—on these grounds—was in favour of outlawing the use of alcohol. Why then and not alcohol?

There are even more interesting angles to this report. Tests with the following materials, all of which are regularly consumed in great quantities and which in some cases are even produced by the human body itself, proved to promote cancer or were at least suspected to do so—

- Kitchen salt
- Lactic acid
- Lecithin
- Cholesterol
- Fructose
- Galactose
- Glucose

These are only the most common ones. We are sure that any of the other cancer causing materials—as reviewed by Hartwell—also end up in the human body, be it by means of nutrition or medicine or that they are even produced by the human body itself.

The above quoted Dr. Griffith Evans finds that one of the strongest cancer causing agents, i.e. methylicholanthrene, is also a derivative of the human bile. And he points to the following interesting conclusions:

1. Cancer is very often the cause of death for continuously unhappy people.

2. Psychic depression and melancholy are generally associated with changes in the bile.

3. Such changes in the chemical build up of the bile were shown in the laboratory (Woolf & Woolf). If one of the components of the bile is subject to change due to the psychic condition of the individual, then we cannot deny the possibility of changes in the other components as well.

4. In other words, it is in the realm of possibilities that methyl-cholanthrene which is known both as a cancer causing agent as a derivative of the bile may be produced by the body [illegible] psychic depression or conflict.

5. For that reason, the [illegible] cancer starts with a change of the psychic attitude, a change of heart, [illegible] according to Dr. Evans is only [illegible] through pardon and faith.

This is not the place to further expound Dr. Evans' conclusions. We merely mention them for the benefit of those readers who are interested in the subject.

For the industry it is of the utmost importance however to know that the recommendations of the Belian Commission for the Study of Cancer, as well as those of the Sao Paulo congress, are not above criticism, at least not where flavours are concerned.

We take it that cancer specialists are not sufficiently familiar with the materials as they are actually used in the aromatic industry and that this caused them to publicize their one sided advices.

We trust however that they—in the light of the above mentioned facts—will reconsider their conclusion and if they have reasons for maintaining their conclusions, we shall be glad to put this magazine at their disposal.

—ALCHIMIST

... IN LEATHER

A method of hand-screening colour prints on leather has been developed by a New York fabric printer for the American Hide and Leather Company at Lowell, Massachusetts. After the pattern has been printed on the calfskin, the tannery puts the leather through a special finishing process that binds the pigment permanently. The resulting leather has the natural beauty and feel of leatheer and can easily be cleaned with wax polish. The first leather with a floral design pattern in four colours is being used in shoes.

A NEW ANTIBIOTIC

Scientists have announced the discovery of an antibiotic which they set has produced 'impressive" improvement in severe pulmonary tuberculosis cases and "good" results in stubborn infections of the genito-urinary tract. The disclosure was made at the Veterans Administration-Army-Navy Conference on chemotherapy of tuberculosis in Atlanta, Georgia. The scientists have, however, warned that it is still too early to define the medical usefulness of the drug, called "Cycloserine." Although early tests have proved promising.

NEW PENCIL

Mechanical pencils that write with liquid lead, instead of solid lead, are now being produced by the Parker Pen Company at Janesville, Wisconsin. The Company is so sure that new pencils will appeal to the public that it has stopped production of convenional pencils and decided to manufacture only the new type hereafter. The Company claims that the new pencil represents the first basic improvement in the lead pencil since its discovery in the Middle Ages. The liquid lead pencil provides more than six times as much ... a conventional lead pencil and is ... of drawing a straight line ... length. The use of liquid lead, ... ly liquid graphite, completely ... the need for sharpening. Each of the ... pencils is loaded with a capsule of ... ed graphite, which is roughly the ... the column of lead in a conventi... pencil. The graphite stays wet for ... life of the capsule and flows to a ... type pencil tip. The pencil produ... more writing than a conventional ... because all of the liquid graphite can ... used, whereas in conventional pencils ... inches or more of the graphite near the ... of the pencil is not used. The liquid graphite now being used has wri... characteristics that are identical to ... phite in solid form, but has one impor... advantage, inasmuch as it does ... smudge.

ELECTRONS FOR FOOD PRESERVATION

The U.S. General Company is ex... perimenting with a 1,000,000-volt el... ron beam generator and is making ... interesting discoveries. With electr... shot out through a narrow metal wind... the machine becomes the source ... highenergy electron beam, which is be... studied for its value in preserving fo... sterilising drugs and surgical equipm... and killing insects. Studies conducted ... food processors indicate that elect... beams may alter and improve exis... food processing methods. There ... three basic aims in food preservation ... method used must destroy bacteria ... mould, must add little to the cost ... must not change food characteris... Electron beams seem to fulfil the first ... requirements quite well, and ... research is under way on the third.

Pharmaceutical Preparations

MOUTH WASH TABLETS

I

Sodium bicarbonate	8	oz.
Saccharine	1	,,
Vanillin	20	gr.
Coumarin	20	,,
Acid benzoic	20	,,
Oil cloves	½	dr.
Oil caraway	½	,,
Oil lemon	½	,,
Oil gaultheria	½	,,
Oil menthol	½	,,
Acid carbolic	½	,,
Oleo-resin capsicum	½	,,
Carmine	20	gr.

Mix, granulate and make into 5 gr. lets. One to be dissolved in half a glassful of water and used as a mouth wash.

The basis for the mouth wash tablets [illegible] bicarbonate with sugar or milk [illegible]. The selected essence is mixed with this and the powder compressed into tablets.

II

Benzoic acid	20	gr.
Boric acid	750	,,
Phenol	25	,,
Sodium bicarbonate	315	,,
Gum acacia, in powder	125	,,
[illegible]	2	,,
Thymol	4	,,
Peppermint oil	25	mins.
[illegible] oil	15	,,
[illegible]	q. s.	

[illegible] ingredients. Then add [illegible] stiff paste with water. [illegible] y and compress into [illegible]

EAR WAX SOLVENT

I

Glycerine	[illegible]	[illegible]
Hydrogen peroxide	1	

II

Glycerine	1	dr.
Saturated sol. of Sodium bicarbonate	6	

In both cases drop into the ear, close with cotton wool, and in ten minutes syringe with warm water.

EYE LOTIONS.

Particular care should be exercised in the case of preparing medicines for the eye, for slightest error can cause damage to the eye instead of alleviating the pain. In preparing eye lotions, it is imperative that sterilised water is used. In order to do this, distilled water is boiled for about half an hour in a glass flask. The mouth of the flask is then plugged with cotton wool while cooling.

I

Boric acid	175	gr.
Water sterilised	20	fl. oz.

When the lotion is made, it should be strained through a small plug of cotton wool. The first portion of the lotion may contain traces of liniment and is therefore allowed to be strained again.

II

Boric acid	100	gr.
Green Extract of Belladonna	100	
Water, sterilised	20	[illegible]

SYRUP OF CITRIC ACID

Citric acid	[illegible]
Distilled water	[illegible]

[illegible] syrup, mixing it well. Then add the [illegible] of lemon peel, shake the mixture and add enough syrup to make the product measure 1000 c. c. Mix thoroughly and preserve it in containers, which have been previously washed with boiling water.

SYRUP OF ORANGE

Tincture of sweet orange peel	50	c. c.
Citric acid	5	grms.
Purified talc	15	,,
Sugar	820	,,
Distilled water		q. s.

Triturate the talc in a mortar with the tincture, add gradually 400 c. c. of distilled water, filter and add sufficient distilled water through the filter to obtain 450 c. c. of filtrate; in this filtrate dissolve the citric acid and sugar by agitation without heat, and add sufficient distilled water to make the product measure 1000 c. c. Mix thoroughly and bottle.

SYRUP OF VANILLA.

Tincture of Vanilla	2	fl. dr.
Simple syrup sufficient to make	32	fl. oz.

COMPOUND SYRUP OF FERROUS PHOSPHATE

Iron	4.3	grms.
Phosphoric acid	48	c. c.
Calcium Carbonate	13.6	grms.
Potassium Bicarbonate	1	grm.
[illegible]		
produce	1000 [illegible]	

Dilute 20 c. c. of phosphoric [illegible] with 25 c. c. of distilled water in a [illegible] flask, add the iron, and heat very [illegible] on a water bath until dissolved; add [illegible] resultant solution to the calcium carbonate, potassium bicarbonate and sodium phosphate, previously triturated with the remainder of the phosphoric acid and [illegible] c. c. of distilled water. Boil the [illegible] with 375 c. c. of distilled water for [illegible] minutes, add the sucrose, boil for [illegible] minutes, cool, strain and pour over the strainer a sufficient quantity of distilled water to produce 800 c. c. Filter into the syrup the solution, containing the iron phosphate, calcium phosphate, potassium phosphate, and sodium phosphate, add the orange flower water, and pass sufficient distilled water through the filter to produce the required volume. Set aside for at least 48 hours; filter if necessary and bottle.

COMPOUND SYRUPS OF HYPOPHOSPHITES

Calcium hypophosphite	45	gr[illegible]
Potassium hypophosphite	15	[illegible]
Sodium hypophosphite	15	[illegible]
Hypophosphorus Acid (30 per cent.)	1	c. c.
Glycerine	50	,,
Sugar	600	gr[illegible]
Distilled water to make	1000	c. c.

Triturate the hypophosphites with water 500 c. c. until dissolved, add the hypophosphorous acid, filter and wash with water until 540 c. c. liquid is obtained. To this add the glycerine and sugar, dissolve without heat and [illegible] [illegible].

Recipes for Small Manufacturers

LIMEJUICE AND GLYCERINE

Almond oil	1	fl. oz.
Glycerine	1	fl. oz.
Tincture of Senegal	2	dr.
Lime water	½	fl. oz.
Rose water	8	fl. oz.
Oil of bergamot	20	drop.
Oil of lemon	40	..

Shake well the oil of almond and tincture of senegal and then add the glycerine, lime water and rose water. Lastly perfume with essential oils. To preserve the cream add 4 grains of salicylic acid to each pint of the cream.

DEPILATORY CREAM

Strontium sulphide	30%
Corn starch	15%
Precipitated chalk	15%
Glycerin	10%
Water	29%
Lavender Oil	1%

Add the glycerin to the water. Mix in the strontium sulphide. When the solution has been effected mix and sift in the preciptated chalk and the starch, then add the perfume. Mix thoroughly until a smooth paste is obtained. The consistency of this paste can be regulated by [illegible] of the starch and chalk mixture.

HAIR DYE.

[illegible]	10	parts
[illegible]	3	..
[illegible]ylamine	6	..
[illegible]	500	..
[illegible]	5	..

[illegible] in alcohol [illegible] other ingredients and [illegible]

Wash the hair first with soap and then mix quantity of the dye with equal amount of hydrogen peroxide, and apply to the still moist hair by means of fine cloth.

As the above dye is composed of a mixture of a reducing agent with a solution of one of phenol group and a metallic salt in such proportions as to prevent them reacting in the solution containing an excess of reducing agents, it require only one application and is not poisonous

INCENCE STICKS

Musk real	20	grs.
Ambergris	20	..
Ambergris	20	..
Powdered benzoin	1	oz.
Powdered camphor	1	oz.
Cascarilla	1	dr.
Powdered saltpetre	1	dr.
Powdered charcoal	2	oz.

Mix and make a thin paste with mucilage of tragacanth, when sticks are made by dipping thin wooden splinters into the emulsion and dry in the sun in the vertical position. The dipping may be repeated twice or more according as to the thickness of the stick desired.

SUGAR CANDY

Sugar candy is prepared from a saturted solution of sugar, formed by adding sugar to boiling water till it dissolves no more. The solution is then run into troughs, in which it is allowed to cool slowly, while a number of threads are hung in the liquid upon which the crystals form, and continue to grow. The time required will depend on the [illegible] sugar treated. In working on a [illegible]

scale, it will be necessary to remove the strings and adhering crystals; then add more sugar to the liquid, boil up, and immerse the strings again while the liquid is cooling. Cakes of candy will also separate on the sides of the vessel in which the liquid cools.

IMITATION GOLD

Copper	80	grams.
Zinc	13	,,
Tin	5	,,
Nickel	2	,,

During fusion add the following per 100 grams of alloy.

Cream of tartar	9	grams.
Manganese dioxide	6	grams.
Ammonium chloride	3½	,,
Lime	2½	,,

PAIN BALM

Yellow vaseline	10	parts.
Methyl salicylate	2	,,
Oil of cajuput	2	,,
Oil of Eucalyptus	2	,,
Menthol	2	,,
Camphor	2	,,
Wool fat	20	,,

Mix thoroughly in a stone mortar and put in wide-mouthed bottles. It may be rubbed gently over the affected parts.

GOLD COLOURING TINS

Shellac	5	oz.
Turmeric	2	,,
Gamboge	2	,,
Dragon's blood	4	dr.
Methylated spirit	3	pints.

Dissolve the ingredients in methylated spirit and apply the lacquer on tin articles which should be thoroughly cleaned with soft soap and not water and warmed.

SEWING MACHINE OIL

Rape oil	10	parts
Alcohol 90%	5	,,

Mix the oil with alcohol and heat the mixture on a water bath until the alcohol begins to boil, the whole being kept stirred. When boiling of the spirit sets in put out the fire and pour the liquid into a large flask of clear glass and expose to sun light until thoroughly bleached.

REMOVING STAINS FROM SILK

To remove stains from silk fabrics treat the spots with hydrogen peroxide or with potassium permanganate solution followed by hydrogen peroxide. Finally wash with water acidified with acetic acid.

SOLID DISINFECTANT

Tallow	7½	lbs.
Rosin	1½	,,
Light Creosote Oil	9	,,
Naphthalene	1	lb.
Caustic soda	1	,,
Water	2½	lbs.

Melt the tallow and rosin and while hot add the caustic soda dissolved in water. Boil until saponified. Then incorporate the naphthalene powder and creosote oil. The mass is spread on a table and cut into cubes of desired size.

BLUE BLACK WRITING INK

Gallic acid	1	oz.
Tannic acid	3	,,
Gum arabic	1	dr.
Carbolic acid	1	,,
Sulphate of iron	2	oz.
Indigotin	1½	,,
Water	7½	pints

Dissolve the gallic acid and tannic acid in 6 pints of hot water and dissolve the other ingredients in the remaining portion of the water without the application of heat. Then mix the two solutions and set aside for a fortnight and filter before bottling.

Formulas, Processes & Answers

DISINFECTING FLUID

578 D. R. M., Banaras—Wants to know the process of manufacturing disinfecting fluid.

Coaltar distillate (of sp. gr. exceeding 1.00)	100	parts
Rosin	85	,,
Caustic soda lye 30°Be	60	,,
Vegetable oil	20	,,
Water	200	,,

Liquefy the resin by the application of gentle heat. Pour in the vegetable oil (castor oil, til oil, coconut oil etc). Now raise the temperature of the mixture to about 100°C and stir in the caustic soda lye. Boil until saponified. Add water from time to time to make up the loss due to evaporation. Then make the soap solution by adding water little at a time until the whole water has been used up. Allow the solution to cool: when cold add the measured amount of creosote oil by continual stirring.

CHINESE BLUE

691 H. S. B., Amritsar—Wants to know the process of manufacturing chinese blue.

Sulphate of iron	63	parts
Yellow prussiate of potash	56	,,
Sulphuric acid (conc.)	30	,,
Bichromate of potash	8	,,

Dissolve the sulphate of iron in 100 gallons of boiling water and also dissolve in a separate vessel the prussiate of potash in an equal quantity of boiling water. Mix the two solutions and boil for 1½ hours. Now pour very sowly the acid and then add the crystals of bichromate of potash. Stir very gently for ten minutes, wash at once and repeat washing at least three times. filter, press and dry.

TIN SLATE.

598 P. S. N., Madras—Wants to know the formula of tin slate.

First prepare the silicate solution by finely crushing equal parts of solid potash and soda silicate and pouring over this 6 times the quantity of soft river water, which is kept boiling for about 1½ hours, whereby the silicate is completely dissolved. Next take 7 parts of fine slate ground with a little water into impalpable dust and mix with I part lamp black. Grind enough of this mass with the previously prepared silicate solution as is necessary for a thick or thin coating. With this compound rough tin plates are painted uniformly and allowed to set.

BARBER'S ALUM BLOCK

Dissolve 100 parts alum in its own weight of water. Add to it 1 part of menthol and 1 part of glycerine. Then heat on a water bath to evaporate the water. As soon as almost the whole of water has been evaporated, pour the hot mass into rectangular moulds and set aside to crystallise. After a day or two take out the blocks and rub their surfaces with hot water to make them smooth.

REDUCING LUSTRE OF ARTIFICIAL SILK

600 K. T. K. A., Madura—Desires to learn the process of reducing lustre of artificial silk.

Since artificial silks, manufactured by different processes, possess different properties, each variety requires a special treatment for reducing its lustre.

In the case of viscose, lustre can be reduced to the point of extinction, even after stretching, by omitting the desul-

phurising process, so that sulphur is left in the spun thread. The normal amount of sulphur in the spun thread can also be increashed by the addition of a soluble sulphide, sulphite or thiosulphate to the viscose soluti , whereby an increased amount of sulphur is deposited on the thread on spinning. A somewhat similar effect can be produced on finished silks by treatment with solutions of su'phides, sulphites or thiosulphates followed by an acid bath, or by treatment with a solution of sulphur in an organic solvent.

Incorporation of liquid petroleum or petroleum jelly, certain oils, fats or waxes, casein in albumen and other organic compounds with the viscose prior to spinning have also been suggested in order to obtain on spinning a thread with reduced lustre.

Other methods applicable to the cellulose silks consist in the even precipitation of barium sulphate on the thread by use of suitable solution of barium chloride and sulphuric acid or solub'e sulphates. The thread is also weighted thereby. Impregnation of silks with soluble titanium salts which are subsequently converted on heating into insoluble compounds has also been found to be effective as a means of reducing the the lustre. Treatment with certain strengths of acids, alkalis and colloids can also effect a modification of the lustre.

In the case of cellulose-acetate, it is possible to modify the lustre of the thread spun in the dry spinning process by varying the amount of moisture in the spinning cabinets.

The lustre of cellulose-acetate si'k is completely removed by boi'ing water or steam, and by boiling it with solutions of certain salts and sugars. By control of the conditions, it has been found possible to vary the degree of de-lustring to any desired extent. Lustre which has been removed by treatment with boiling water can be restored by treatment with acetic acid, phenol and other organic compounds and solutions of ammonium sulphocyanide.

One method proposed which is of some interest consists in treatment of the acetate silk with ammonia and esters of aliphatic acid (e.g., ethyl oxalate), which not only effects a reduction in lustre but also gives to the silk a special scrooping effect.

In the case of cellulose-acetate fabrics and yarns a dull finish can be obtained by an olive oil soap bath containing O. 1% to O. 25% phenol at 100°C. The degree of dullness depends on the phenol content and Ph value of the soap solution, as well as on the time of treatment.

ASPHALTUM PAINT

315 S. R., Coimbatore—Wishes to have formulas of asphaltum paint.

Asphaltum	10	parts
Rosin	3	,,
Lampblack	1	,,
Petroleum	25	parst.

Mix the ingredients together and shake occasionally until dissolved.

BELL METAL

379 M. T. W., Pattambi—Wants to have a recipe of bell metal.

Bell metal is an alloy of copper and tin. To prepare it fuse in a fire clay crucible a mixture composed of copper 4 parts and tin 1 part using a little borax as flux.

PERFUMED BETELNUTS

283 J. K. L., Lahore—Wishes to have a formula of preparing perfumed betelnuts.

To prepare perfumed betelnuts, take betelnut chips and then mix it with a small quantity of glycerine. Next put some harmless pink colour like ammoniated carmine solution and finally perfume with menthol, eucalyptus oil, camphor, etc., the proportions of which may be determined by a couple of trials.

MAKING BONE MEAL WITHOUT MILL

294 K. V. B. S., Godugupeta—Wants to learn a process of crushing bones without mill

Bones, in country places, where mills are not available, may be reduced to powder by means of caustic lye (solution made out of ashes), quicklime or freshly calcined wood ashes. A simple plan is to pack the bones layer by layer with freshly calcined wood ashes in a barrel, and keep the mixture moistened for several months.

A quicker method is to boil the bones in an iron boiler with strong caustic lye. The proportion of bones and lye to be used is roughly 15 parts by weight of bones to 5 parts by weight of caustic soda or 7 parts by weight of caustic potash dissolved in 15 parts by weight of water. The boiling should be done for 2 or 3 hours. But even without boiling the bones would be disintegrated, being simply kept in the caustic liquor for about a week.

Another method of softening bones is by mixing them in heaps with quicklime and loam. A layer of loam 4 inches deep is first spread, and on this is put a layer of bones 6 inches deep and above this a layer of quicklime, 3 inches deep. The layers of loam, bones and quicklime are repeated until the heap reaches a convenient height, when it is covered all over with a thick layer of earth. Holes are then bored in the heap from the top and water poured down them to slake the lime. The mass will become hot and remain so for 2 or 3 months, after which, the bones will become friable, and whole heap may then be mixed up and spread as manure on land.

PREPARATION OF BRONZE POWDERS

To prepare gold bronze powder mix an equal quantity of oxide of tin and sulphur. Now heat for some time in an earthen retort, until thoroughly incorporated. Then reduce the mass to powder.

To prepare silver bronze powder mix equal parts of bismuth, tin and mercury. Fuse the mixture in a crucible adding the mercury only when the tin and the bismuth are in fusion. Next reduce to a very fine powder.

To apply these bronzes use white of egg, gum arabic, or varnish. It is preferable to apply them in dry form upon one of the above named mediums serving as size, then to mix them with the liquids themselves, for in the latter case their lustre is impaired.

GILDING OF CARDS

526 G. P., Banaras, Cantt.—Desires to know a process of gilding sides of cards.

To gild the edges of cards proceed in the following manner. Cut the edges of cards perfectly smooth and then wash over with a solution of isinglass in weak spirit, or with a varnish made of Armenian bole 4 parts and powdered sugar candy 1 part, mixed up to a proper consistency with strain 1 white of eggs. Allow the coat dry and then rub it with a wet rag. Then apply gold leaf and polish with the burnisher.

CEMENT FOR BROKEN GLASS

331 S. N., Deolali Camp—Wishes to know a good fomula for mending broken glass and also processes for manufacturing washing soap, mukhbilas etc.

Oil of clove	20	min.
Casein (as fresh as possible)	10	oz.
Quicklime	1	..

Make into paste with water and apply quickly. Will mend almost anything, but surface must be clean and afterward bound tightly together.

WASHING SOAP BY SEMI-BOILING PROCESS

Coconut oil		2½ mds.
Caustic soda	20 seers	10 ch.
Water		2 mds.

Prepare the lye which will be at 27°Be. Mix the oil and the dye together put in an iron pan, and apply heat. Continually stir for 1 or 2 hours, when the paste will gradually thicken. Slow down the heat at this stage but continue stirring. After a time the paste will turn into a white semi-solid mass, which forms the soap. Fill the mass immediately into the frames.

MUKHBILAS

Coriander seed	1	tola
Aniseed	1	..
Parsley	1	..
Nutmeg	1	..
Ajawan	1	..
Saffron	1	..
Seeds of cardamom major	1	..
Seeds of cardamom minor	1	..
Cloves	1	..
Dry rose petals	1	..
Chua	1	..
Camphor	1	..

Take one tola each of the ingredients excepting the last two and soak them in good rose water for 12 hours. Then bray them together to a paste form and incorporate chua and camphor.

CEMENT FOR WALKING STICK HANDLES

466 D. S. V., Banaras Cantt.—Wants to know process of making cement for walking stick handles, etc.

Melt 4 parts of shellac and stir in 1 part Venice turpentine; this cement must be melted before being applied. Cement made by dissolving glue in acetic acid would also be suitable: it is one of the strongest cements known, and will adhere to almost anything. If any exudes, wipe off with a cloth damped with hot water.

PAINTING ON CHINA OR PORCELAIN WARES

212 A. B., Bilaspur State—Desires to know the method of painting on china or porcelain wares.

To paint china or porcelain wares with gold or silver decorations, take a small quantity of colourless copal varnish and triturate in it a sufficient quantity of gold or siver leaf in a mortar. Then paint the wares with this varnish. Allow the decorations to be nearly dried and coat them with a thin film of Japan lacquer, prepared by mixing ordinary collodion with about 4 per cent. of castor oil. The thin film left by this varnish, after the ether has evaporated is thoroughly waterproof, so that the varnished articles can be cleaned with a wet sponge or brush.

This varnish being very volatile should not be applied with a brush because it would dry under the brush itself; it must be poured over the articles to be coated, and the latter allowed to drain. After leaving it untouched overnight it will be found perfectly dry, and will retain its fine gloss and handsome appearance permanently.

Reader's Business Problems

[Reader's business problems will be discussed in these pages. We invite the reader to write us his difficulties. As the department is in charge of an experienced businessman who is specially adept in dealing with such problems and to whom experiences of a large number of successful businessmen are available, his replies will lead the enquirer to a successful career. These replies will be published in the paper only and cannot be communicated by post.]

PROSPECTS OF FISH CULTURE IN TANKS.

539 P.C.R. Burdwan—Requests us to discuss the prospect of fish culture in tanks.

Fish farming is an important industry of East India (Bengal) Southern (Madras) and Western India (Bombay) has a double importance in it not only being a source of livelihood of millions of fishermen but also a means of subsistence of the people of these places. Thesse areas specially Bengal are purely rice eaters. Rice lacks in nutrients which will be balanced by protein fish. Thus fish is essential to supplement the diet of Bengalees who are mostly rice-eaters. This business is very lucrative.

Tanks are divided in two classes for fish culture viz: tanks suitable for fish culture and tanks unsuitable for fish culture. By proper adjustment and care barren tanks can be made to produce fish. Newly dug and cleared tanks do not contain fish food so fish in these tanks do not increase in weight. But by supplying cowdung, excretion of domestic birds and beasts, and cakes, green grass and other organic food such as ammonium superphosphates, etc. these tanks may be made to productive for fish culture.

Old and uncleared tanks having too much vegetation and muddy clay in the bottom is not suitable for fish culture. These tanks can be made productive by first clearing then supplying fish food mentioned above.

Tanks containing proportional quantity of vegetation and fish are suitable for fish culture. But these also require adequate supply of fish food from time to time.

Tanks having steep and deep side walls abound in fish, tortoise and even snakes which are enemies of rohi, katla, mrigal and other varieties of fish. In order to make productive these tanks should be free from fish enemies by drying them from time to time.

Of the productive tanks shallow annual tanks are suitableo for fish culture. Water remains in these tanks for 9 or 10 months in a year. The sun's rays reach to the bottom of shallow tanks and thereby freed from poisonous gas which is detrimental for the growth of fish. Fish grow very rapidly in these tanks.

According to Dr. Hora sloping tanks 500 ft. long and 4 ft. to 10 ft. deep are ideal for fish culture.

Tanks with big trees on South and West sides is conducive to growth of fish.

After selecting the tanks attention should be paid to selection of the type of fish suitable to a locality. Only healthy, reliable and proper seed should be introduced. The type raised should be quick growing. It is always better to find out the possibilities of raising the local fishes. Any local fish that grows 2 lbs. in weight in a year is economic to grow. Then there is no need to bring seed from outside. Attempts should at the same time be made to preserve the breeding fish. It is uneconomic to kill them, as a "Rohi" fish gives returns equal to that of a cow. Spawns of "Rohi" fish are very costly and a "Kanaka" of it weighing about a seer fetches handsome prices.

For success of fish farming enthusiasm, willingness to work with one's own hands and and the full knowledge and understading of the fish farming are absolutely essential.

To make the enterprise successful all necessary improved implement to carry out various operations are very essential. Like agriculture these implements are of foremost importance. To start with a "Harra" should be purchased. Without provision of proper nets, it is not possible to manage the farm. A few kinds of nets detailed below should be purchased. Net for collecting spawn is of very fine mesh and is made of fine thread. "Chat-jal" is of ½ inch

(Continued on page 888)

Queries and Replies

686 M.L.B., Amritsar—you may start manufacture of small articles of rubber. If you manufacture nipples rubber balloons and other small articles you may invest Rs. 1000 in the beginning. There is no institute where training is given on rubber goods manufacture.

687 M.K., Sheikhupura—Matches may be had of Eastern Match Co., Thirumangalan; Brilliant Match Works, Sivakasi. Coimbatore Match Industries Ltd., Coimatore, Hind Matches Ltd., Sivakasi; Krishna Match Works, Chattrapatty, Via Sattur; Oriental Match Works, Dindigul, Palabhat Match Co., Palabhat and Prabatha India Match Co., Salem.

688 T.E.X.L., Nizamabad—You may take up manufacture of bricks. For machines and appliances write to Martin Burn Lad., 12, Mission Row, Calcutaa.

690 M.A.C., Jullundur City—We have no book dealing with bone business. You better enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta and W. Newman & Co Ltd., 3 & 4, Old Court House Street, Calcutta,

692 K.C.R., Calcutta—An article on fluxing appeared in December, 1954 issue of Industry.

694 N.A., Purulia—Soaps may be had of Banga Luxmi Soap Works Ltd., 7, Chowringee Road, Calcutta-13; Calcutta Chemical Co. Ltd., 35, Panditia Road, Calcutta and Calcutta Soap Works, Calso Park Tilfala, Calcutta. Katal fountain pen ink is manufactured by Chemical Association (Calcutta), 55, Canning Street, Calcutta and Sulekha ink is manufactured by Sulekha Works Ltd., Jadavpur, Calcutta-32. Ghee may be had of K. Rajalingeswar Rao, 130, Jhani Jhenkan Road, Royapeth, Madras and V. Ramaswamy Naidu, Jothi Vilas, Ghee Mandy, 15-39, Kothal Perumal Koil Street, Coimbatore. Scented coconut oil may be had of Jewel of India Perfumery Co., C-cola House, Behala, Calcutta and Mira Chemical Industries Ltd., Prince Anwar Shah Road, Tollygunge, Calcutta.

698 P.V.A., Madras—Plaster of paris is usually manufactured from gypsum. For this purpose first grind the gypsum into powder in a disintegrator, then pass it through 100-120 mesh screen. The fine powder thus obtained is heated to about 120 5°C in an iron vessel and kept at this temperature for some time. During this period stir the material with a ladle.

699 S.N.A., Dabwali—For lottery tickets enquire of Royal Calcutta Turf Club, 11, Russell Street, Calcutta.

700 S.K., Ramavaram—Process of manufacturing all kinds of soap will be found in Manufacture of Soap published from this office, price Rs. 4/12/- including postage. Prorcess of manufacturing biscuits will be found in Home Industries published from this office, price Rs. 3/12/- including postage.

704 P.N., Poona—Process of manufacturing transfers will appear in due course.

705 C.B.V., Surat—You may take up manufacture of hosiery such as knitting socks, etc., paper bags, handkerchief manufacture on small scale.

706 K.V.Y.R., Secunderabad—Process of manufacturing arc carbon will appear in due course.

707 R.C.P., Jharia—Address of Indian Paper Mills Association, is 23-B, Netaji Subhas Road, Calcutta; address of The Vanaspati Manufacturers Association of India is Arya Bhawan, Graham Road, Ballard Estate, Bombay-1.

708 H.S.T.M.C., Hindupur—Process of manufacturing fountain pen ink will be found in Manufacture of Ink published from this office, price Rs. 3/12/- including postage. Process of manufacturing soap will be found in Manufacture of Soap published from this office, price Rs. 4/12/- including postage. Process of manufacturing fountain pen will be found in Mechanical Industries published from this office, price Rs. 3/12/- including postage. For practical training negotiate with Prof. M. N. Mitter, 79/4/2D, Raja Nabakissen Street, Calcutta.

709 R.C.P., Jamalpur—Waxes of all kinds may be had of Banshidhar Dutt, 126, Khengrapatty Street and Calcutta Chemical Co. Ltd., 10, Bonfield Lane; both of Calcutta.

712 N.M.G., Atrauli—For fountain pen engraving machine enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

712 S.M.C.A., Secunderabad—Old copies of Industry are not available. Aerated water essences may be had of Essence Supply Agency, 6, Colootola Street; P. S. Dutta & Bros., 8, Ezra Street and Mukherjee & Sons, 3, Ezra Street; all of Calcutta.

716 A.A.R., Poona—We assure you our help whenever you require.

717 A.C., Rajahmundry—For making wax crayon you have to weight out the base first and then the pigments for a particular colour with proportions as specified below: Base:—Stearic acid 65 lbs.; Hard paraffin wax 75 lbs. For this base add for red, red oxide or venetian red 12½ lbs.; for yellow, chrome yellow light 12½ lbs.; for black, carbon black 6 lbs. 6 oz. and for blue, prussian blue 7½ lbs.

718 D.R., Tuni—For cartons enquire of The Cardboard Box Mnfg. Co., 38, Colootola Street; K. Gupta & Co., 49, Garpar Road, Universal Cardboard Box Factory, 45, Ezra Street and Mitter & Mitter (1918), 1C, Raja Kalikissen Lane; all of Calcutta. For flavouring tooth paste you may use vanillin and bitter almond oil.

722 K.C.K., New Delhi—You may try the following recipe of pain balm:— White vaseline 30 parts; Paraffin hard 14 parts; Oil turpentine 5 parts; Oil bergamot 2 parts; Oil cajuput 2 parts; Oil lemon grass 1 part; Oil eucalyptus 2 parts; Menthol 2 parts; Camphor 8 parts; Thymol 3 parts.

723 L.N.S., Siliguri—It is very difficult on our part to suggest improvement of anything without knowing the exact formula worked by you. You may however try the following formula Sweetened condensed milk 3 lbs.; Full cream milk 1 quart; Sugar 3½ lbs.; Glucose 4 lbs.; Butter ¾ lb. Vanilla, salt and flavour.

724 M.M.A., Vellore—For dies and battery plate making machine write to Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

725 M.G.A.P.S., Mangalore—An article on cardboard manufacture appeared in January 1955 issue of Industry. For machines enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

726 S.C.A., Agra—Yes you may start a match factory at any place where wood suitable for match industry is available in large quantity. It has good prospect for future. In this connection you may consult Safety Matches and Their Manufactore published from this office, price Rs. 5/12/- including postage. You may also start import and export business with Rs. 25,00|-.

727 C.S.V., Managalore—Printing machines may be had of Indo-Swiss Trading Co. Ltd., P-33, Mission Row Extension; John Dickinson & Co. Ltd., 6, Clive Row; Indian Machinery Ltd., Dassnagar, Howrah and Printing & Industry Machinery Ltd., Windsor House, P-14, Bentinck Street; all of Calcutta.

729 J.V.B., Nidadavole—Safetypin making machines are not avaiable in India at present. Pin and paper clip making machines may be had of Bharat Industrial Corporation Ltd., 7, Mission Row Extension and Oriental Machinery Supplying Agency, Ltd., P12, Mission Row Extension; both of Calcutta.

731 S.C.B, Raipur—Rhodamine and brilliant croseine may be had of Fuzle Hussein & Bros 44, Armenian Street, Calcutta. Glue may be had of Banshidhar Dutta, 126, Khengrapatty Street Calcutta.

A NEW BOOK

We have received a copy of Bharat Shasantantra Sar (Constitution of India in Brief in Bengali) by an experienced teacher. As its name suggests the book will be interesting to students eager to be enlightened on the Indian Constitution. The book is published by Prakashika Ltd., 3, Ramanath Mazumdar Street, Calcutta-9. Price of the book is 8 annas.

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mesh, "Ghamasarang" is of ¼ inch mesh, "Sarang" French and Portuguese Possession in India is of ½ inch mesh, "Gujril" is of 2 inches mesh, "Barjal" is of 1½ inches mesh and one even of bigger mesh for harvesting bigger fish. Fish farming even under ordinary conditions is a paying proposition. At a low and moderate estimate an acre of fish farm easily give a profit of about Rs. 100|- to Rs. 200|- per year. Pisciculture has been and still is in the hands of the illiterate fishermen. Very little scientific research work has been done to explore its possibilities as an important source of national wealth. According to Dr. Hora if a fish farmer paid as much attention to his pond as an agriculturist does to his land, pisciculture would be much more paying than agriculture.

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